The Veterinary Record

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 27. JULY 2, 1938 VOL. 50.

Immunity Following a Natural Attack of Foot-and-Mouth Disease

M. CRAWFORD, M.R.C.V.S.,

DEPUTY DIRECTOR (ANIMAL HUSBANDRY) AND GOVERNMENT VETERINARY SURGEON, CEYLON

Until a few years ago the generally accepted opinion was that immunity following a natural attack of foot-and-mouth disease was of short duration. In recent years, however, research workers in Germany, France and Great Britain, as a result of laboratory experiments conducted mainly with guinea-pigs, have shown that immunity may last as long as two years following artificial infection.

Very few records based on experience in the field are available in the literature. For this reason it is considered useful to publish the following short account of experience gained at the Government Dairy, Colombo, during the past seven years.

This dairy is situated on the outskirts of the city of Colombo; it has been in existence on its present site for the past 22 years and is in the charge of the Government Veterinary Surgeon. The dairy carries a normal stock of from 100 to 125 cows in milk with, in addition, dry cows, young stock, calves, stud bulls and cart bulls. In all, the total stock is usually in the neighbourhood of 250 head of cattle. This stock is carried on an area of approximately 85 acres. The area available for grazing is very small. The bulk of the stock are housed for the greater part of the day in open sheds. They are fed on purchased concentrates and on grass which is grown on the dairy premises. The grass, chiefly Mauritius grass *Panicum muticum*) and Napier grass (*Pennisetum purpureum*), is cut daily and fed to the cattle in the sheds.

Foot-and-mouth disease is enzoötic in Ceylon. Outbreaks occur in some part or other of the Island every year and are of frequent occurrence in the city of Colombo and its environs. Eradication of the disease from the Island by a slaughter policy as adopted in Great Britain and other countries is impracticable on account of local conditions. Control of the spread of infection by police measures is very difficult and in practice very ineffective. In the less developed parts of the country there are large numbers of susceptible wild animals such as buffalo, deer, and pig; grazing grounds are seldom or never fenced; village cattle are often semi-wild and attempts to control their movements during outbreaks meet with little success; the common method of transport is by means of bullock cart, interference with which causes severe dislocation of trade and agricultural operations.

Under such conditions it will be readily understood that the difficulty of preventing infection gaining entrance to a dairy herd is almost insurmountable. Indeed, every dairy in Ceylon from time to time suffers from this disease. In this respect the Government Dairy differs little from any other and throughout its 22 years' existence on its present site there have been a number of outbreaks.

Where the Government Dairy does differ from other dairies is that all cattle in the herd are numbered and details of their records are available in the registers of the dairy. The following account is based on these records and on the writer's personal knowledge.

Since the year 1930 the incidence of foot-and mouth disease has been as follows:—

1930—An outbreak in February with 89 cases.
1931—An outbreak in May with 106 cases.
1932—No cases.
1933—No cases.
1934—No cases.
1935—No cases.
1936—An outbreak in May with 73 cases.
1937—An outbreak in January with 20 cases.
1938—An outbreak in March with 32 cases.

Here it may be mentioned that when this disease appears in the dairy such measures as are practicable are taken to prevent its rapid spread throughout the herd. This is done with the object of preventing as far as possible complete cessation of the output of milk.

These measures are by no means as stringent as one could wish. All the cows in milk, normally about 100, are housed in one block of open sheds. The calf sheds immediately adjoin the cow sheds, the calves being separated from the cows by a wall 4½ feet high which does not reach half way up to the roof of the sheds.

The measures adopted may be summarised as follows:—

Immediately the first symptoms of the disease are noticed the affected cow or calf is removed from the main sheds and housed in temporary sheds erected for the purpose at a distance of some 300 yards. Separate attendants are detailed to look after the sick and they are prohibited from entering the main sheds. The sick animals remain in the temporary sheds until the acute stages are past. The duration of their stay varies with the severity of the lesions; in mild cases it is usually from 10 to 14 days, at the end of which time they are washed in disinfectant solution and returned to the main sheds.

Judged by British standards these measures would be considered very inefficient. The progress of the infection through the herd is undoubtedly delayed by these measures with a result that there is always a considerable proportion of the cows in milk, which either have not yet contracted infection or which have recovered from the acute stages and are coming back into milk.

These points are mentioned to show that the conditions on the dairy are such that when the disease does appear ample opportunity exists for spread of infection and usually one would expect all or nearly all of the cattle to become infected. In practice this does not occur and the fact that in every outbreak a very considerable part of the herd escapes infection can be explained only on the basis of immunity developed as a result of a previous attack.

Examination of the record of outbreaks given above will show that this immunity must last at least as long as two years.

The points in the record which are particularly worthy of notice are as follows:—

In each of the years 1930 and 1931 outbreaks occurred. The total number of cases in these two outbreaks was 195. A very considerable proportion of the herd at the end of '1931 were survivors of the 1930 and '31 outbreaks while of the remainder others were survivors of outbreaks prior to 1930; in other words, most of the cattle in the herd at the end of 1931 had at some time or other suffered from foot-and-mouth disease.

No other outbreak took place until May, 1936, that is, exactly five years since the 1931 outbreak. During these five years outbreaks occurred in all parts of Ceylon and were not uncommon in Colombo and in the villages immediately adjoining the Government Dairy. The freedom of the dairy herd for so long a period as five years is difficult to explain except by the theory that most of the cattle were immune.

Every cow is branded with a serial number when it joins the milking herd either by purchase or being drafted in from the herd of heifers. The herd is largely self-contained and in normal years purchases are few.

The serial number gives an indication of the length of time any particular cow has been in the herd and the exact date on which she joined the herd can be verified from the register.

In the 1936 outbreak it was very noticeable that it was chiefly the cows with the highest numbers which developed the disease. This was so striking that the history of each cow which became infected was examined. This showed that out of the 73 cattle which became infected only three were survivors of the 1931 outbreak. It is unfortunately not possible to say whether these three were affected in 1931 or not. The remaining 70 were all cattle which had joined the herd after 1931.

The next outbreak was in January, 1937. This time 20 cases occurred. All the affected animals were either cows purchased or calves born after the outbreak in May, 1936. Not a single animal which had been affected in 1936 developed the disease in 1937.

The next outbreak took place after an interval of 14 months, namely, in March, 1938. During that interval no new cows had been purchased. The only additions to the herd were calves born and two Ayrshire bulls imported from Scotland.

These two Ayrshire bulls were undoubtedly susceptible. They were housed in a separate shed at a distance from the main buildings. When the disease appeared in the main shed in 1938 every effort was made to prevent communication between the imported bulls and the affected herd—apparently with success as these two bulls did not develop the disease.

In this 1938 outbreak 32 cases occurred. Every one of the animals which developed the disease on this occasion was a calf born in the interval of 14 months which had elapsed since the 1937 outbreak. Not a single cow which had been affected in either the 1936 or the 1937 outbreak developed the disease.

The conclusion seems irresistible that immunity developed as a result of a natural attack in May, 1936, was still existing in March, 1938, that is, nearly two years. If this conclusion is correct—and one has no doubt that it is correct—then it must follow that each of the outbreaks in 1936, 1937 and 1938 was caused by the same strain of virus. Unfortunately no work has been done in Ceylon on the typing of virus of foot-and-mouth disease so it is not possible to say whether these outbreaks were due either to one of the recognised A, O, or C strains or to some virus

Glauramine as a Wound Dressing

R. ISHERWOOD, M.R.C.V.S.,
University of Liverpool

A conversation with a recent graduate who has been using auramine as an internal medication and external dressing in cattle practice has prompted the writer to relate experiences during the last ten years of glauramine, a solution of medicinal auramine, as supplied by British Drug Houses Ltd.

According to British Drug Houses, auramine "is a diphenyl-methane dye stuff. It is a yellow solid, soluble 1 in 250 in water, 1 in 70 in rectified spirit, 1 in 60 in absolute alcohol, and 1 in 30 in glycerin. It decomposes in temperatures above 70 deg. C. Solutions in alcohol and glycerin are permanent."

Glauramine is a solution in glycerin and alcohol. It is described as "a sterile, stable solution of medicinal auramine B.D. brand," and directions are to the effect that it "merely requires to be diluted with water to be ready for external use as an antiseptic. It should be diluted the same day as required, and old dilutions should not be used. On dilution with 20 volumes of warm water (temperature not to exceed 70 deg. C.) it gives a solution of auramine of 1 in 1,000 strength."

Auramine is stated to be "a powerful antiseptic, and very dilute solutions (1 in 5,000) of it inhibit the growth of such organisms as staphylococci, streptococci, *B. diphtheriae*, *B. anthracis*, *B. typhosus*. . . . Culture media containing auramine diluted 1 in 5,000 have been inoculated with living cultures of these organisms, and on incubation for two days have proved to be sterile."

It is also claimed to be non-toxic to the higher animals.

In human practice it is considered "to find its most important applications in the treatment of gonorrhoea, and in nose and throat surgery. It is recommended also for the treatment of mouth ulcerations such as pyorrhoea, and Vincent's angina. It has proved valuable in the treatment of ringworm."

Attention was first attracted to glauramine and its possibilities by a surgeon who had used it with success in cases of a chronic streptococcal skin affection of women. It seemed then that it might prove to be of value in some of the cases of so-called follicular mange in the dog which the well-known parasiticides had failed to clear up. It was first used on two cases of this type: Two bull terriers were moderately affected about the head, legs and paws. A solution of glauramine 1 to 20 was used daily for a fortnight. It was applied by means of surgical wool soaked in the solution, and applied with some friction with the object of securing greater penetration. For a further two weeks the application was made every other day. These cases were kept under treatment for three months, and during this time there was a slow but steady improvement, until finally at the end of that time they could be considered to be cured. Fortunately it was possible to keep these dogs under observation for the next two years and to note that the condition did not recur.

With this encouragement, glauramine has been tried in many apparently similar cases, with varying results, and it has been concluded that its value lies in dealing with those cases which, in the main, are due to a bacterial skin infection. It does not appear to be effective against the follicular mite, nor can it be expected to cure the many cases of canine eczema which are due to internal causes.

It has proved useful in resistant cases of patches of skin infection in dogs and cats, which sometimes follow persistent scratching. It has been used as a first dressing for wounds, and it seems to be non-irritant. But perhaps its greatest value has been in cases of septic bite in cats. Many badly affected, suppurating legs have responded to a daily application by means of swabs and irrigations where necessary, of the 1 to 20 solution.

In no case in the experience of the writer has there been a toxic effect either from absorption or by licking, and that it is thoroughly licked is amply demonstrated by the yellow staining of the animal's tongue. In fact, the only disadvantage of glauramine, apart from the instability of its dilutions, is the intense yellow staining of hair and skin which it occasions. In coloured coated dogs this does not matter, but the parts covered with white hair remain yellow so long as the hair persists. The hands of the operator also are stained for about one day, but this can be avoided by using india-rubber gloves, or washing the hands in a solution of chlorinated lime or eusol. These latter do not quite remove the stain but they diminish its intensity.

Finally, much is gained in the case of the home treated and house frequenting animal by the use of a skin dressing which does not smell and is not greasy.

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which contains links for all three of these recognised strains.

The latter possibility is, of course, only an intriguing speculation but the existence of a master virus which contained links for all three of the strains which have been studied in various European laboratories is not beyond the bounds of possibility.

My thanks are due to Mr. J. Habaragoda, G.B.V.C., the resident Manager of the Dairy, for keeping the records on which these observations are based.

Glasgow

(Contributed)

It has often occurred to the writer that but for the defacements of industrialism Lanarkshire would be one of the loveliest of counties. The southern half of the county, which lies outside the industrial belt, may not be one of Scotland's show places, but it is beautiful enough for any taste, with its mixture of pastoral and moorland country and its heaving uplands, the whole dominated by Tinto peak. Here the Clyde is undisturbed, save by occasional anglers pensively casting their lines on the clear brown water. Leaving the rural parts and coming into the region of coal and steel, if you stand on the high ground just south of Glasgow, the wide sweep of the Clyde Valley is still a very striking scene, scarred even as it is by the operation wounds of a rude and drastic surgery for the extraction of minerals from its bowels. It is not difficult to imagine how entrancing it might all have been had there not lain deep within it the ores which are the basic factor of our present civilisation.

Much more imagination would perhaps be needed to picture what Glasgow itself might be like if it were not a great industrial and seaport city. In this article it is not the writer's purpose to speculate on the Glasgow that might be —Glasgow itself is seeing to that—but with natural wealth on the one hand and the sea on the other, the city was well situated to take advantage of the impulse to manufacture consequent upon the introduction of the steam-engine and the use of coal. If this brought, as it did, increase of wealth and importance, something also was lost, something of beauty and grace and mellowness of life. It was a bad old conception that industry and elegance could not exist together, and like many another city, Glasgow found itself possessed of ugly slum areas, which now it is busily engaged in sweeping away. And whatever Glasgow does is done with energy, whether it be plunging into industrialism or clearing away the resultant unsavoury features. Cities have a personality, and this is Glasgow's: vigorous, vivid, vital—a city that will do things. All the modern social and political movements in Scotland have their origin and chief support here; Socialism, Communism, Nationalism, Social Credit, all that goes under the general connotation of Clydesideism. But the people are of a warm kindliness, free in manner, friendly to strangers, perhaps just a little preoccupied in their own affairs. The brand of humour that finds favour is full-blooded and democratic. The sophisticated wit that pleases West End theatre audiences leaves the people here cold. Their comedians speak with the authentic voice of Glasgow, rising from the teeming tenements and the streets. The things they joke about and caricature are the things Glasgow knows. They are life. Did not C. B. Cochran say that in all Europe he had not seen so good a comedian as Tommy Morgan? Glasgow doesn't know about that, but likes Tommy Morgan anyway, and all his kind.

But Glasgow's interests do not stop short of a quite notable culture. Writing for the Press, mainly on Scottish affairs, is a group of journalists not excelled anywhere. Their names may not be widely known outside, but they have their public at home, and ample material for their pens. And they can write. Here, too, is the home of the Scottish Orchestra, and the famous Glasgow Orpheus Choir. Some may remember the stir created nearly 40 years ago by the painters of the Glasgow school, whose works, when exhibited in Paris, brought a reviving breeze from Nature into the salons of a somewhat jaded European art. Of the members of that school, some are now world-famous: Guthrie, Harrington Mann, Lavery, Hornel, to name only a few.

Glasgow University

Scottish Travel Association.

Glasgow is often spoken of as a dismal place, and it cannot be denied that parts of it are of a drabness equalled only by that which exists in every big city in the kingdom. Still, there are some fine views and fine buildings. The outlook from Kelvin Hall across the park to where the University is set high on Gilmorehill is spacious and imposing. For a change of scene, go to the docks. Crowded shipping in the harbour, tugs fussing about, strange names of ships, tall masts, funnels of many colours; all that is not ugly, it is stirring and romantic, conjuring up thoughts of distant places and the wide ocean.

Chief of Glasgow's buildings is the Cathedral, built during the period from the twelfth till the fifteenth century, with a crypt which is acknowledged by experts to be the finest in Europe. On this site, Saint Mungo, the patron saint of

the city, is said to have founded the first church in the sixth century, beside the Molendinar burn, a stream now diverted discreetly underground. According to legend he was here visited by Saint Columba. Glasgow, indeed, seems to have had some connection with saints, for it is claimed that Saint Patrick was born just outside the city. His well can be seen to this day, on the edge of a busy street, with trams and buses passing continuously. Strange, is it not, the attachment which saints and heroes have shown for certain wells? But the tradition is a pleasing one, and far be it from your contributor to cast any doubts on the matter. Although it is a far cry back to Saint Mungo, the reader will see that the story of Glasgow is not only one of smoke and modernity.

Almost as dimly remote is the Glasgow of the ballad makers. The very cadence of their words echoes from a different world.

"When we cam in by Glasgow toun,
We were a comely sicht to see;
My Love was clad in the black velvet,
And I myself in cramasie."

A brave and comely sight, we believe; riding gaily through Glasgow town to the sorrow that waited for them.

If mineral wealth lies on one side of the city, on the other there is wealth of natural beauty unsurpassed. Travel along the Great Western Road, a route which visitors to the Congress will take on one of the outings, and soon the fret and fever of the city are forgotten in the calm majesty of nature. Here is the "road to the isles," and to the lochs, the mountains and the jewelled sea. It is a road that many will follow this year, attracted to the West of Scotland by the Exhibition.

Glasgow has a good record in exhibitions. Few can now recall "The Groveries" of 1888, but the great International Exhibition of 1901, and the Scottish Exhibition of 1911, are well within memory. Superb weather graced both of these, a long succession of sunny days and velvety nights, when it seemed as if all the world came and held carnival. This year again is carnival year. Once more Glasgow is "at home" to the world.

It was reported at a recent meeting of the National Farmers' Union Council that the Bacon Board had sought the support of the Union to a proposal that in the event of a foot-and-mouth outbreak it should be permissible for pigs to be moved from a restricted area to a free area for slaughter. It had been pointed out that the proposal was full of danger as animals might be moved from a restricted area which, although showing no signs of the disease was, in fact, infected, with the result that the slaughterhouse premises would become infected and the infection spread in many directions. It was agreed that it was undesirable that there should be any relaxation of the present regulations.

REVIEW

Animals in Chemical Warfare

[By Veterinary General C. E. Richters, German Army, Extracted from *Revue Vétérinaire Militaire*: Translated by Lieutenant K. I. Barlow, R.A.V.C. Reproduced, by permission, from *J. Roy. Army Vet. Corps*, February, 1936.]

The book falls into the following parts:—

(1) Historical details, classification and general actions of gases.

(2) Details of: Tear Gas, Asphyxiants, Skin Irritants, Irritants and General Poisons.

(3) Protection.

(4) Conclusions.

Chemical warfare represents the more recent step in modern warfare, and, whilst such a thing did not happen in the last war, the possibility of the use of gas against a civilian population must not be lost sight of. The duty of governments is, therefore, to study and to put into effect the steps necessary to protect their civilian populations, and with this in mind it seems extremely regrettable that the lives of our animals have not, up to this stage, been taken seriously into consideration, the reason for this omission being no doubt the novelty of the situation. Thus it becomes the duty of the Veterinary Department to evaluate and to improve upon the available means of protecting animals.

This is a new chapter of pathology open to them, because with the much-debated question of the use of "motor or horse" in future wars, it may be possible to reply with the formula "horse *and* motor," and we know too well the price that was paid for the gap in the knowledge of the Veterinary Service on this subject. As recently as 1928 the disaster at Hamburg, in which a tank containing phosgene exploded and accounted for the deaths of practically all animals, domestic and otherwise, within a radius of seven miles, brings home to us the terrible effectiveness of the "chemical arm."

Finally, in view of the possibility of massive contamination of forage, both at the front and in reserve dumps, the responsibility of proper food inspection falls not only on the veterinary officer, but on the civilian veterinary surgeon as well.

For the origin of chemical warfare one has to go back to very early times, when warriors defended their fortresses and produced noxious fumes by burning such things as wet straw, green wood, feathers, resin, sulphur, etc. With the progress of science the art evolved itself slowly, but with the introduction of firearms

its progress was stopped up to present times, when the equilibrium between the fighting arms led to research for new weapons, and it was in 1914 at the time of the establishment of trench warfare, and when the armies were below ground, sheltering from bullets and shells, that the idea of using poisonous gases returned to people's minds. The production and use on a large scale of these chemical substances, amongst other things, fell largely to the credit of German scientists.

The objects of the "chemical arm" are:—

(1) To harass and surprise the enemy.
(2) To drive him from his resting places with irritant gases in order to force him into open warfare, and then finish him off with more effective arms.
(3) To render ineffective, in certain cases, the enemy's protection.

In other words, put the enemy temporarily *hors de combat* without inflicting upon him a permanent disablement.

The first poison gas was used in October, 1915. Actually, it was in the form of finely pulverised particles, and, although the results were at first a little disappointing, owing to the wind often being in the wrong direction, there was an assurance that the principles were right.

At Langemarck on April 22nd, 1915, the first gas attack, using chlorine, took place with definite success, but not on a large enough scale; nevertheless, on the Eastern Front, on May 31st, 1915, the process gave definitely good results. But in spite of these successes, the policy of using gas in cloud form was soon abandoned. Then both sides started using gas shells, the French favouring phosgene ($COCl_2$), and the Germans diphosgene [synonyms: perstoff; trichlormethylchloroformate: $(COCl_2)^2$; superpalite; croix verte=Army name]. As fast as the other side found suitable gas-masks, a new substance was put in the field. The Germans used mustard gas [synonyms: yperite; dichlorethylsulphide; $S(C_2H_4Cl)^2$], also the so-called "Croix bleue" series; diphenylcyanarsine $(C_6H_5)_2$ AsCN; and diphenylchlorarsine $(C_6H_5)_2$ AsCl; thanks to which they prevented the penetration of their front in 1917-18.

Germany is now assuming the initiative in researches in connection with chemical warfare, and is establishing the condition governing the use of, and the method of firing, gas shells. In future wars, what will be the rôle of the chemical arm? Undoubtedly one must be prepared for a strong attack, not only upon one's fighting troops, but involving inland towns as well. On the whole, however, it would not be easy to contaminate a very large area of country unless enormous quantities of poison were used. All theorising on this latter point is bound to be unsatisfactory owing to the insufficient data available regarding aerial transport. A few gas bombs thrown out from an aeroplane would never have anything more than a local effect because the wind, *and, above all, the rain*, are the strongest natural combination against gas. For example, it has been estimated that a gas attack upon Berlin would be successful only on 50 days in the year. Some authorities, in fact, think that one should be prepared for much greater effects from aerial torpedoes and incendiary bombs than from gas bombs, although no power has yet given up the latter. On the other hand, the possibilities of synthesising new toxic substances are limited, yet researches are being carried out to a certain extent everywhere in order to increase the efficiency of those substances already known.

Susceptibility of Animals to War Gases

The author thinks the assertion that the horse enjoys a natural immunity to gases is a fallacy and puts the misunderstanding down to certain facts.

(1) False statistics published in certain works (the ratio of losses from gas to losses from other causes not being known).
(2) The existence of very definite idiosyncrasies.
(3) The influence of local conditions.

In the German Army on the Eastern Front in April, 1918, out of 312 horses treated for gas poisoning, 59 were lost; whilst in June, 1918, 45 were lost out of 286 sick. Lustwig stated the mortality to be 36 per cent. Altogether, between August, 1917, and August, 1918, out of a total of 2,259 animals treated, 322 died, or 14·2 per cent.

This considerable diminution in mortality was perhaps arrived at through rational methods of protection, even when the enemy were using gases more toxic than those originally used. The French statistics show 32 deaths out of 137 sick from asphyxiants, and one death out of 507 sick from irritant gases.

In the British Army, Moore gives, from July 1st, 1916, to November 31st, 1918, 2,200 with 211 deaths and the low figure of 9·5 per cent.

American statistics show 31·4 per cent. mortality, whilst no Russian or Austrian statistics were published.

Undoubtedly there were cases of individual resistance; some horses were acutely affected by slight quantities of poisons, whilst others were only slightly affected by stronger concentrations. Account must also be taken of the time and place. During the first attacks of 1915, most of the transport was behind the lines, hardly in any danger. It can safely be said that the numerous alleged cases of immunity, particularly to phosgene, were based merely upon scattered observations which took into consideration neither the concentration of

the gas, the duration of the attack, nor—most important of all—the physiological state of the individuals (rest, work, sweating, etc.).

The German contention in trying to explain this pseudo-immunity is that the horse, by virtue of its height and carriage of head, inhales a less toxic atmosphere than man, when lying on the ground or sheltering in a trench. But this explanation fails to hold water, since the gas cloud produced by the explosion of a shell reaches a height of from 16 to 20 feet, and the concentration of gas from ground level to five feet is the same. Neither does the author think that the arguments having the anatomy of the horse as their basis (narrowness of the nasal cavities, greater ramification of the bronchii, etc.) can be sustained.

The respiratory area of the horse, relatively small compared with the cutaneous surface, is greater than that of man compared with his bodyweight. The quantity of gas inhaled by a horse, together with a relatively greater volume of air may, of course, be significant in the same way that in a low dilution in air the same gases are not perceptible to man. In the higher animals from the first penetration of gas into the respiratory tract, a defensive reflex in the form of a bronchial spasm takes place, but this is only of temporary value and may fail altogether in the presence of carbon dioxide, acetylene or phosgene in low concentrations. Also the excitement of animals under shell fire gives rise to very deep inspirations usually at the precise moment of the arrival of almost pure gas; the intake rises from 50 to 100 litres and the gas exerts its maximum toxic effect. In fact, laboratory experience as well as that gained in the last war warrants the emphatic statement that gas poisoning does not represent such a lethal factor in the horse as in man, but that, as regard susceptibility, horse and man are equal. Brisson has, however, clearly shown that the skin susceptibility of the horse is greater than that of man.

For the above reasons, the following conclusions remain:—

(1) The horse has no special resistance except to tear gas.
(2) Other things being equal, the horse is as easily poisoned as man.
(3) In the course of a future war the losses from gas would be higher than those suffered in the last war, and, moreover, animals far behind the lines would probably be involved.

The author discredits the lurid accounts appearing in the sensational Press on the subject, and rightly points out that there does not exist a poison which will destroy everything, and that each of them has its definitely limited properties. The study of the action of poisonous gases upon plants shows that certain vegetable species are more susceptible than others, but in every case susceptibility varies with the concentration. Vegetation over which chlorine has passed becomes bleached, the leaves become brownish and start peeling off. It appears that weeds, etc., recover quickly, but coniferous plants are more seriously affected. Phosgene and the other substances used are about equal in their properties of destroying plants, but no particular action has been noticed upon the earth itself.

General Properties of Gases and Their Action on Animals

Actually the word "gas" is wrongly used in describing the chemical substances used in warfare, as they are in fact solids or liquids, projected in a state of very fine division, or which pass into a gaseous state only at the moment of the explosion of the shell. These products are mainly respiratory poisons, but some, on the other hand, act on the skin.

From the physical point of view gases used in war are found in the following states:—

Suspension: consisting of particles no greater than 1/16 mm.
Smoke and clouds: with negligible tendency to dispersion.
Gases and vapours: in a state of molecular suspension in the air, characterised by a strong tendency to dispersion.

Of the 50 or more gases used during the last war, only a dozen or so are likely ever to be used again, whilst a few "gas mixtures" are retained because of their having the sum of the properties of their component parts represented.

The principal properties of a poison gas are: great volatility, high specific gravity and consequently slow diffusion and tendency for the gas to keep to the ground level, solubility in aqueous solutions, fats or lipoids, and capabilities of being absorbed easily.

The principles of protection against gas depend largely upon absorption of gases, and in practice rain is the greatest enemy of gas. Chemically, the majority of poison gases are complicated organic compounds or halogen compounds, and they divide themselves into those which have a local action (irritants) and those which have a general action after absorption. The irritant action is often followed by the general toxic action; thus mustard gas in low concentration is very toxic, but has no local action, but in high concentration has a strong vesicant action. The specific effects of a gas depend upon its concentration and the duration of its action.

Experimental work upon the known poison gases have resulted in the following formula (according to Habert):—

(1) Coefficient of toxicity:—

$W = Ct.$

(C = concentration in mgr.)

(t = minimum time in minutes)

showing that the lower the concentration the more time is needed to obtain an effective action. The coefficient serves to determine the approximate toxic value for a given species. The author insists, however, that the formula should not be accepted as infallible.

(2) An index known as "Muller's quotient of established defence," which gives the relation of the ratio of the toxicity of a given gas to the tolerance of an individual to its action. The higher the value of the quotient is raised, the more will the irritant action of the body exceed the toxic action. The "Quotient of Muller" does not, however, appear to have any great value.

(3) The "limit of tolerance" is represented by the weight of the toxic substance, whether solid, liquid, or gas, contained in a cubic meter of air, and which is not tolerable to a normal man for more than one minute.

Some gases produce their action only *after absorption*; for example, carbon monoxide and hydrocyanic acid, in sufficient concentration. The latter was left out in the last war owing to the difficulty of establishing a given concentration in air. The German classification of gases is based upon the military and physiological points of view:—

Offensive.—"Croix verte," tear gases, lung irritants (chlorine, phosgene). "Croix verte," irritants (arsenicals).

Defensive.—"Croix jaune," skin irritants (mustard gas, yperite). General toxins, carbon monoxide, smoke clouds, etc.

Thus, according to its concentration, a gas may be classified in one group or another.

Pathology and Therapeutics of Gas Poisoning

Tear Gas and Asphyxiants

The following are the gases entering into this category:—

Halogen derivatives: phosgene (carbon oxychloride and derivatives), chloropicrin, chlorine, bromine, bromacetone, chloracetone, bromobenzyl, chlorphenylacetone, benzylbromide.

Nitrogen derivatives: nitric and nitrous oxides.

The author does not dwell upon their chemical and physical properties but passes on to the study of their respective action on animals.

Although tear gases in high concentration and in prolonged contact may act as pulmonary irritants, they do not warrant much notice in view of their relatively feeble and transient action on the eyes of animals. This relative insensibility is difficult to explain, since it is present with some, whereas others, *viz.*, chlorine and certain arsenicals, give rise to a very marked reaction.

Phosgene has the following properties:—

(1) Prompt action (irritation of mucous membranes and epithelia).

(2) Intermediate and delayed actions. Clinically poisoning by phosgene is recognised in three forms:—

(*i*) Hyperacute form—following absorption of gas in high concentration.

The animal falls to the ground and dies immediately or within an hour.

(*ii*) Acute form—characterised by the onset within an hour of muscular tremors, cold sweats, pain, restiveness, unsteady gait, depression, head lowered and stretched forward, dilated nostrils, dirty blood-tinged nasal discharge which later becomes adherent in scabs, distressed and accelerated respirations (80 to 100); on percussion the chest is at first resonant, but later muffled and soft, provoking pain; various râles are heard and are followed by oedema. Temperature 104° to 105°, conjunctiva injected, pulse 80 to 100, full and bounding at first, later irregular and hardly perceptible; finally coma and death.

(*iii*) Sub-acute form: starts with a cough; the other signs at first few or entirely absent, appear in an attenuated form in six to twelve hours after the attack; respiration 40 to 60, pulse 50 to 70, inappetence and refusal to drink for 24 to 48 hours.

Very few symptoms are shown in this stage, only a dry cough and uneasy respiration form a slight oedematous condition of the lungs. Temperature remains normal and general condition little changed.

Lesions (from observations by the author and experiments on cats, etc.).

(1) The absorption of very diluted phosgene vapour has no irritant action, nor does it give rise to any reflex in the deeper parts of the lungs.

(2) The characteristic lesion in acute cases is oedema of the lungs, due to irritation of the vagal nerve endings, alteration in the alveolar epithelium and the perialveolar capillaries, rapid transudation of plasma filling these alveoli and the branchioles. Nevertheless, at this stage oxygen is still absorbed and carbon dioxide excreted.

(3) In the hyperacute cases the *post-mortem* picture is very much the same, with death from asphyxia but no oedema of the lungs. It appears that the irritation of the alveoli is due to the specific action of the phosgene and not to any hydrochloric acid liberated by the phosgene in contact with the tissues. In contact with

mucous secretions and the blood, phosgene decomposes—$COCl_2+H_2O=CO_2+2HCl$.

This HCl in sufficient quantity has a corrosive action on the alveolar walls and renders them no longer capable of absorbing oxygen or of excreting carbon dioxide, hence the rapid death from asphyxia. The question arises whether the secondary lesions are the result of the local thoracic lesions or the result of the absorption of the poison? The author has in numerous *post-mortem* specimens noticed a congestion of organs, the origin of which appeared to be in the lungs. The nervous changes are explained by vagal reflexes. That the action of phosgene is to produce oedema is borne out by *post-mortem* examinations of sheep poisoned by phosgene at the time of the Hamburg disaster, when large areas of emphysema of the lungs were observed.

The first changes in the lung tissue are foci of blue or darkish red colour appearing first on the main lobes, due to the formation of haematin in the venous blood. Finally the whole of the lungs are involved, exchange of gases becomes impossible, and death occurs from asphyxia, the animal drowning in its own secretion. If the oedema remains localised it may be absorbed, the symptoms subsiding without any exaggerated coughing. Another result of the breakdown of lung tissue is the formation of emphysematous patches in the interlobular tissues as well as other areas such as mediastinum and subcutaneous tissues.

The immediate action of phosgene is on the circulatory system. Although there is no toxic action, no haemolysis nor liberation of haemoglobin, the latter is converted into haematin (whence the brown colours of the lung lesions). At the height of the condition the number of red blood corpuscles may reach twelve to thirteen million, but the blood picture shows nothing beyond a slight degeneration of leucocytes. The exudation of plasma from the lungs may occur to the extent of three to six times the weight of the lungs; at the same time, an enormous effort on the part of the heart is required to force the thickened blood through the capillaries, and there follows a fall in speed of flow, rapid coagulation, thrombus and embolus formation. The distress of the heart is aggravated by accumulation of carbon dioxide and lack of oxygen. Other clinical symptoms are the presence of albumin in the urine in the form of casts and epithelial debris, diarrhoea in the horse and dog, marked haemorrhagic gastro-enteritis in the sheep (*vide* explosion at Hamburg from a distance of eight or nine kilometers). Actually the sheep is probably the least resistant of domestic animals.

The *post-mortem* appearances of animals dead from phosgene poisoning vary with the concentration of the gas. *Hyperacute cases* following sudden death usually show marked redness of the larynx, trachea and bronchioles; acute congestion of the mucous membranes, but no oedema of the lungs; heart soft, the left side dilated and full of uncoagulated blood resembling coal-tar.

Acute Cases.—The lungs are very distended and marks left by the ribs are seen on their surfaces. The lungs are increased in weight several times and subpleural haemorrhages are present. The peribronchial and interlobular connective tissue shows star-shaped areas with a fatty appearance due to the presence of oedema, and areas of the visceral pleura are covered with small air-filled vesicles which have the appearance of millet seeds. The parenchyma between the lobules shows yellowish fatty streaks corresponding to the connective tissue, which is distended and saturated with oedema. When this surface is cut and pressure exerted upon it, a yellow sticky fluid exudes from which separates a greyish serum. Lesions in other organs are: trachea and bronchii full of foam, blood vessels containing blackish blood, pericardium distended with yellow fluid, heart soft and dilated, star-shaped haemorrhages under the epicardium, punctiform haemorrhages on the surface or under the endocardium. Myocardium soft, ventricles and great vessels full of dark-coloured blood. Congestion of the spleen, liver and kidneys. The last-named organs are greyish-red in colour and may show haemorrhages in the cortex.

In the case which has had a slow onset, the *post-mortem* findings are: chronic bronchopneumonia in well-defined areas, the rest of the lung looking like skeletal muscle.

The prognosis obviously depends upon the degree of the poisoning. Thus the hyperacute form is always fatal, in the acute type the outlook is very unfavourable and one must be prepared for the complication of bronchopneumonia and pleurisy, whilst in the sub-acute form, which is the commonest, the prognosis is more favourable. Generally the fate of an affected animal can be decided upon in 48 hours; if favourable the oedema will be absorbed in a few days, but complete recovery does not take place until three or four weeks have elapsed. In the mild cases the prognosis is good and the sequelae are rare.

In the "Croix verte" group the gas chloropicrin must not be over-looked because during the War it was used by the Germans, mixed with diphosgene, and by the Allies, mixed with 20 per cent. zinc chloride. Stable and insoluble in water, this substance has an irritant action in the lungs (oedema), and after absorption an action on the heart and central nervous system. In a small dose the respiratory symptoms predominate. It has a haemolytic action, breaking haemoglobin down into methaemoglobin, and

the lesions produced are in heart, liver and kidneys.

The nitrogen gases are very irritant, especially to the lungs and to a lesser degree the upper respiratory passages. The symptoms and lesions resemble those of phosgene, but besides these a "nitrogen shock" has been seen (dilatation of the heart, fall in blood pressure and formation of methaemoglobin).

Chlorine, also extensively used in the past, causes a very painful cough (with oedema of the lungs and other symptoms of toxaemia), brick-red coloration of the mucous membranes, fever, weakness and collapse.

In a general sense it can be said that all the substances of this group liberate, on decomposing, acids and inorganic substances, and are capable of provoking an acute inflammation of lung tissue.

If the diagnosis of "gas poisoning" is easy, the diagnosis of the particular gas is often practically impossible in the early stages.

Skin Irritants

(1) Lewisites [diphenylchlorarsine $(C_6H_5)_2$ AsCl, and derivatives].

(2) Mustard Gas or Yperite [dichlorethyl-sulphide $(C_2H_4)_2$ SCl_2].

Lewisite, as used in the War, was a mixture of the following: diphenylchlorarsine diphenylcyanarsine and triethylchlorarsine. The name originates from the discovery of the substances by the American Lee-Lewis, but the German chemists Weiland and others had prepared it as early as 1915, by the action of acetylene on arsenic trichloride. Realising its properties, the Americans banned its use and called it the "dew of death." In the pure state it is a colourless liquid of density 1·9 with the odour of geraniums, and changing after a few days to a dark colour. With its composition and violent action on the respiratory system it approximates to the so-called "Dick" of the "Croix bleue" series. In the presence of moisture it rapidly dissociates, solutions of washing soda break it down almost instantly, and it is quickly destroyed by oxidation. These disadvantages gave rise to its elimination from warfare in 1918, and the American Army had to deposit its supplies in the sea.

Mustard gas (synonyms: yperite, because it was used first at Ypres in 1915, and the German "lost" from the names of its investigators Lommel and Steinkopf) is, however, the more important of this group. It was discovered about 1860 by the German chemist Niemann and was re-discovered by Mayer in 1866.

In the pure state yperite is a clear, oily liquid, with a boiling point of 215° and a density of 1·26 and a faint indefinite odour, but as used in war it is a heavy, oily, brownish-tinged liquid giving off a characteristic odour of horseradish, due to the ethyl sulphide, it is scarcely miscible with water, but soluble in fats and animal oils. It quickly works through cloths and rugs, and eventually through rubber. Its property of persisting, under certain conditions of coldness and dryness, renders it particularly applicable to defence. In hot and humid conditions, mustard gas only persists for two or three days before becoming ineffective. The liquid decomposes in the presence of oxidising agents such as peroxides, potassium permanganate, and of course bleaching powder, and this process of oxidation is the basis of principles of protection against mustard gas. According to the dilution and the force of the explosion mustard gas is met in the following forms:—

(1) Mists in the form of very fine particles carried by the wind and effective from long distances.

(2) Droplets dispersed in a radius of ten meters around the burst.

(3) Vapours arising from liquid in contact with vegetation, on the soil, etc., which slowly break up under the influence of the sun's rays and a high temperature.

Lesions in the horse are: violent pruritus (often noticeable after ten minutes), oedematous patches on the skin, chiefly the hairless parts, varying in size from that of a nut to that of an apple, acute tumefaction of the labio-buccal mucous membrane, bright red at first, becoming bluish red later, salivation and oedema of the eyelids to the extent of the almost complete closing of the eyes, cloudiness of the cornea, keratitis and iritis, purulent bilateral nasal discharge, sublingual lymphatic glands enlarged, cough rare, breathing often uneasy with occasional bronchitis and broncho-pneumonia, rapid rise of temperature, pulse feeble and irregular, unsteady gait in certain cases.

Necrosis follows the oedema of the skin, moist eczema, ulcers on the lips and in the mouth with ragged borders and brownish-red bases, putrid nasal discharge mixed with shreds of mucous membrane. In cases which recover resolution of the ulcers takes several weeks, and there is general loss of condition with attacks of fever. Death may follow in 24 to 36 hours from heart failure. In the dog the skin lesions are less severe, but prolonged vomiting may occur.

The action of the mustard is increased in the presence of sweat, and in the horse the lesions are relatively more important than in man.

Brisson estimates the skin receptivity of the horse to be four or five times greater than that of man. The eye lesions are often the first noticed, the horse again being the most susceptible, and the eye may show all the signs of inflammation from simple conjunctivitis to keratitis, perforating ulcers, iritis, etc. After

recovery, the eye appears to have a greater susceptibility.

Death following involvement of the respiratory system is usually from asphyxia following occlusion of the bronchioles and the larynx or from a gangrenous pneumonia. The alimentary lesions occur after ingestion of contaminated forage, grass, etc., and are characterised by formation of typical vesicles on the lips, in the mouth, pharynx and oesophagus. Intestinal lesions are revealed by a bloodstained diarrhoea. The question of whether absorption of the toxin takes place *via* the skin or *via* the lung alveoli has not been cleared up. In many cases the general lesions are the same as following direct contact, with emaciation and anaemia (but no organic lesions *post mortem*).

In the dog a big diminution in the number of red blood cells takes place before death. Microscopically there is a hypertrophy of the vascular endothelium and large quantities of haemosiderin are present.

Our present knowledge does not allow any very hard facts to be laid down regarding the exact action of mustard on the tissues, despite the numerous experiments that have been carried out *in vitro*. The principal theories advanced upon the subject are:—

(1) Cellular degeneration by direct contact (Fleury and Wieland).
(2) Intracellular breakdown of acids, direct penetration of the cell by mustard gas followed by hydrolysis with formation of thiodiglycol, which is harmless, and hydroscopic hydrochloric acid, which is extremely destructive.
(3) "Ehrlich's theory"—cellular fixation of chemical bodies and of their oxidation products in the system.
(4) Damage to the vital functions, pancreatic and others.

It is concluded that characteristics are:—

(1) Slow development of the process.
(2) Prolonged action.
(3) Severe local and general lesions.

The points of differentiation in the actions of the mustard and phosgene groups are:—

(1) Phosgene readily dissociates in a watery medium, or in the blood, whilst mustard gas, owing to a low solubility, remains a long time without dissociation.

(2) Prognosis can be made definitely within 48 hours, if phosgene is the causal agent, and the prospects can be improved considerably by rational treatment, in contrast to mustard gas with its slow and insidious action.

Mustard-gas lesions can be classified into mild, serious and very serious, the mildest cutaneous lesions responding to treatment in from three to four weeks, deeper ones in four to six weeks, whilst in extensive areas of necrosis, cicatrisation is slow. In fact, if not very serious from a clinical point of view, from the military point of view the aspect of a case of mustard-gas poisoning is very serious owing to the long period of convalescence and ineffectiveness involved.

Irritants, Arsines, Etc. (*Croix bleue*)

The substances in this series are chiefly arsenical compounds, whose chief advantage is the ease with which they can be incorporated in shells. After the shell bursts, the particles in suspension are so fine that they can traverse protection apparatus.

The chief members of the group are: —

Diphenylchlorarsine $(C_6H_5)_2$ AsCl:
"Clark I," solid.
Diphenylcyanarsine $(C_6H_5)_2$ AsCN:
"Clark II," solid.
Diphenylaminochlorarsine $(C_6H_5)_2$ NAsCl: "Adamsite," solid.
Ethydichlorarsine (C_2H_5) $AsCl_2$:
"Dick," liquid.
Chlorvinislarsine dichloride:
"Lewisite," liquid.

War experience has shown that animals are less sensitive to these substances than man; nevertheless, even in low concentration the effects on animals can be very serious and may appear after a few minutes. The symptoms shown are profuse lachrymation, spasmodic cough, profuse salivation and watery nasal discharge, distress and profuse sweats. The irritation reaches its maximum in from 15 to 20 minutes, and symptoms subside slowly after that. In the horse the conjunctiva is usually injected, and there is pruritus, eruptions on the lips and nose, and haemorrhagic oedema of the lungs in some cases.

In the dog the effects produced are unsteady movement at first, followed by rapid emaciation and prostration, profuse haemorrhagic diarrhoea, and death in about three weeks.

The military advantage of the substances of this group is their intense irritant action which puts the individual *hors de combat*.

Other Toxic Substances

Carbon monoxide.
Hydrocyanic acid.
Hydrogen phosphide.

Poisoning from carbon monoxide was due in most instances to shells bursting in stables and farms, when the spent gases contained as much as 60 per cent. carbon monoxide. The gas fell into disuse early in the war owing to its volatility. The mechanism of its action is well known: it becomes fixed to the oxygen of the blood, forming carboxyhaemoglobin.

Symptoms: giddiness, frenzy, collapse, profuse sweating, paralysis of the hind quarters, spasms and asphyxia.

The use of hydrocyanic acid was very limited, also owing to its volatility, and the only cases of poisoning by it recorded are those which occurred in animals under anti-pruritic treatment in special chambers, when absorption occurred through cutaneous wounds. It paralyses the respiratory centre, and animals fall to the ground in tetanic convulsions and die rapidly. From a smaller dose there occur frenzy, dyspnoea, restlessness, vomiting, epileptiform convulsions, respiratory failure, and death.

Hydrogen phosphide, produced by the decomposition of phosphorus in the presence of water, is a colourless poisonous gas with a faint smell of rotten eggs. It has its action on the central nervous system and on metabolism, and in general resembles prussic acid.

Artificial Fogs

Their object from a military point of view is to obtain a tactical advantage, by hiding a force from view. The production of these clouds depends upon the highly hydroscopic properties of certain substances when suspended in air in a state of very fine division. The substances used in this process are chlorosulphonic acid and sulphur trioxide, solutions of the latter in water giving "fuming sulphuric acid" (the cloud thus formed being known as "acid fog"). The zinc fogs produced by a mixture of carbon tetrachloride and zinc dust, and called "Berger's mixture," were a French invention. Tin and silicon tetrachloride were also used. In practice animals suffer little damage from these, as they are rarely in any but a low and harmless concentration.

The excitement caused by the appearance of the so-called "fog of death" on the River Meuse in Belgium in 1930 opened up the question of the harmfulness of these "fogs." In this affair the local animals, particularly game, made a rapid evacuation of the district when possible, whilst those which remained appeared restive and suffered some respiratory distress. Zernick and Thierauf have studied the burns occurring from this source. They described a primary cauterising action and a secondary acid action, and have reached the following conclusions:—

(1) That poisoning by absorbed phosphorus passes off quickly.

(2) That phosphorus has no specific action on body cells.

The early identification of an offensive gas is admittedly of great importance, and it is suggested that dogs whose olfactory organs are sensitive to infinitesimal quantities of gas could be used to give early alarms of the arrival of gas. They could be specialised in definite gases and taught to assume certain characteristic attitudes in the presence of these gases which could be interpreted as reliable warnings.

THERAPEUTICS

Only the outline of treatment in each group is laid down.

Asphyxiants, Phosgene, Etc.

(1) Fit masks as soon as possible.

(2) Evacuate animals from the danger zone at an easy pace which will not provoke deep respiratory movements.

(3) Take the easiest route.

(4) Give complete rest. Once out of the danger zone the animals should not be walked, but put on rail or motor transport and rugged up.

Inhalations of oxygen for a total period of five minutes (four or five times per hour, making up the five minutes) or subcutaneous injections of oxygen by fixing a hypodermic needle to the inhalation apparatus and making the injection into the chest wall or flank in the horse or into the back in the dog. The oxygen should be injected slowly till a certain local tension is reached varying with the severity of the case; 12 to 20 litres in 24 hours in the horse, two to three litres in a single injection for a dog. No undesirable sequelae are observed, and in order to avoid the loss of oxygen, as soon as the injection is completed collodion is applied over the site and the area massaged. The swelling constitutes an oxygen reserve from which exchanges are made with the carbon monoxide of the capillaries. The oxygen is absorbed in from 12 to 36 hours. In the more severe cases the combined methods of inhalation and subcutaneous injection are recommended.

Intravenous Injections are recommended in cases of extreme urgency, when about 5 c.c. of oxygen are introduced, allowing about three minutes to complete the operation. The neutralisation of phosgene in the tissues by inhalations of alcohol, ammonia, etc., is almost completely ineffective, because, as already stated, phosgene decomposes almost immediately in contact with body fluids.

The prevention of oedema calls for the following precautions: Give complete rest. Treat all apparently mild cases as if they were severe. Bleed four to six litres as soon as possible, and repeat if necessary in 24 hours. When the heart is distressed and collapse is imminent, inject "artificial serum" with six per cent. gum arabic into the jugular (two to three litres). Copious rectal irrigations and plenty of drinking water.

Make use of the synthetic camphor group of drugs (ephedrine, ephedrenalin) to stimulate the heart. Avoid morphine and choral in the

horse owing to their depressant action on the respiratory centre. Relieve the coughing fits with warm inhalations of turpentine or weak alkalies.

The subcutaneous injections of calcium chloride in the horse have not met with the same success as in the dog and cat, and its use does not appear to be devoid of danger, since it tends to paralyse the respiratory centre. "In any case, it must be given slowly, as 0·1 gr. per kilogramme body-weight may cause death from heart failure."

The following solution has been recommended:—

Calcium chloride, 40 grammes.
Magnesium chloride, 15 grammes.
Distilled water, 15 grammes.

Intravenous injections of glucose 20 per cent. have been tried in dogs poisoned with phosgene, 300 c.c. being given every three days. In the horse, two to three litres can be injected *via* the jugular vein, but knowledge on this point is lacking. Summary — copious bleeding, oxygen, cardiac stimulants, glucose intravenously. No morphine, inhalations, strict hygiene.

Vesicants, Mustard, Etc. (*Croix jaune*)

Curative Treatment. — Washing the whole body with warm solution of soda in water, or solution of bleaching powder, soap or potassium permanganate. Also abundant spraying with tepid water. The mucous surfaces require three to four per cent. sodium bicarbonate solution. Sensitive parts of the skin (pasterns, genitalia, points of contact with the harness) should be washed with a solution of bleaching powder and liberally sprayed with warm water. In these cases bleaching powder appears to be the best curative agent. The affected areas are easily recognised by the eruption of the hairs as soon as ten minutes after the attack. If the droplets are still visible they should be removed, without disseminating them, with cottonwool which is promptly burned.

Buschu, with five years' experience at the gas defence station at Brelok, estimates three minutes as the maximum delay for bleaching powder solution to be effective in man, whilst with the horse and dog 20 minutes may elapse, provided the application is then vigorous.

Localised lesions, particularly those of the limbs, should be treated with warm solutions of hyperchlorite of soda.

After the sloughing has taken place, which should not be hurried, sulphur ointments are recommended, and in certain cases, particularly lesions of the pasterns, radio-therapy produces good results. In ocular lesions lavage over long periods with physiological salt solution is better than instillations. Keratitis should be treated first with antiseptic lotion and later with alkalis, and the following ointment is recommended:—

Sodium bicarbonate	... ...	2 gr.
Sodium biborate	... ...	1 gr.
Anhydrous lanoline	... ...	10 gr.
American vaseline	... ...	80 gr.
Distilled water	... ...	10 gr.

Respiratory apparatus; insufflation of antiseptic powders and irrigation with antiseptics for the nasal cavities, vaseline for the scabs. Morphine or heroin for bronchial or laryngeal spasms, bleeding or oxygen to prevent oedema, etc., etc.

The treatment of lesions caused by Lewisite is also founded on the process of oxidation, but opinions are divided as to lesions produced by this substance.

Waller in America, and Rovida in Italy state as a result of experiments on monkeys, guinea-pigs, and mice that it produces a necrosis similar to that produced by yperite, but Buscher in Germany arrived at the conclusion that lesions caused by Lewisite are less severe than those caused by yperite, and that the period of recovery is about the same as in the case of "Dick" or dichlorarsine. Nevertheless, the danger of absorption of Lewisite does not appear to be as great as Rovida and Wetler suggest, since Buscher has, on numerous occasions, succeeded in injecting 1·34 gr. of Lewisite per 70 kilos body-weight without producing arsenical poisoning.

Arsenical Compounds (*Croix bleue*)

The treatment of cases in this category is symptomatic. Chlorinated inhalations (compresses containing slaked lime and sodium bicarbonate solutions) are useful, and generally animals return to work in two or three days.

General Poisons

Again oxygen forms the basis of treatment for general toxins. With the addition of five to six per cent. carbon dioxide to stimulate the respiratory centre, oxygen causes liberation of the carbon monoxide in proportion to the amount introduced. Thus—remove from the danger area and put the animals in the fresh air; oxygen and CO_2 inhalations, caffein and camphor for the heart; avoid morphine, peripheral stimulation, etc. Bleeding can be carried out at a later stage in conjunction with blood transfusion.

For HCN poisoning a 10 per cent. solution of sodium thiosulphate in sterile water can be given, one litre being injected intravenously.

With gas clouds, particles still adhering to the skin should be removed, without rubbing, with a cloth or sand, or peat can be thrown over the animal and removed with plenty of water.

For phosphorus burns prolonged baths or irrigation with 5 per cent. sodium bicarbonate or 2 to 3 per cent. sodium carbonate solution are recommended.

Necrosis of the skin resulting from phosphorus shows a natural tendency towards recovery.

Protection of Animals against Gas

General Protection

General protection provides for the preservation of animals behind the lines where individual protection cannot be applied.

With armies, the following precautions must be taken: careful choice of stables and bivouacs, avoiding cross-roads, valleys running in the direction of the enemy, trenches, etc.: cover the ground with herbage, with moss or with double covering of tent material (canvas) impregnated with a neutralising solution.

Against mustard in bombarded zones: prohibit access to affected pasturage and watering in shell-holes where it may exist on the surface of the water, a film of mustard indicating danger.

Remove it from impregnated harness by washing with bleaching powder. Cover over the standings of sheds and byres, etc., with earth, 10·5 kg. (25 lb. approximate) to the square metre, which has been mixed with soapy solutions, left three hours, then thoroughly washed and exposed to the air.

Make every effort towards evacuation, according to prearranged plan, of gassed animals.

Construct special hospitals with suitable material; and drugs available.

General protection concerning the areas behind the lines is rather beyond the author's intended scope, yet he points out that establishments associated with the feeding of the populace must be enabled to work in safety. as also must the arrangements for the feeding and general husbandry of animals.

Foodstuffs should be carefully packed in cases protected by "bituminous cardboard," or if they are of small bulk they should be covered by greaseproof paper or by cellophane.

If the contamination is due to "Croix verte" the commodities are fit for consumption as soon as the odour has left them after prolonged exposure to air, but if it arises from substances of the vesicants group or arsine group, the danger persists. The degree of contamination of forage is revealed by the smell, but there is a risk even if there is no smell. To avoid this danger, foods should be spread out, shaken, turned over several times an hour, and exposed to sunlight. Oats, for instance, can be rinsed in several changes of warm water containing bleaching powder. Bran, flour, and biscuits are safe after half-an-hour's cooking, or repeated washing in boiling water, which should be safely disposed of, as it is dangerous.

The foregoing are the general principles, "but," says the author, "one must be prepared to meet considerable difficulties for which one must produce one's own solution."

Action of Poisonous Gases on Water

The action of gases of the phosgene group, being immediately decomposed in contact with water into HCl and CO_2, presents no danger from this point of view.

Only chloropicrin remains unchanged, and owing to its irritant action on the mucous membranes, animals must not be given water containing it.

General poisons, either in the form of gases or clouds, have no injurious action on water. But certain precautions are necessary when clouds of HCN are in contact with water or other liquids (milk, etc.) for long periods. Watering animals from running water is safe, but not from ponds and ditches, etc.

Meat, Provisions and Fish.—As soon as the animal is slaughtered remove the mustard-gas-infected skin, wearing gloves, and prevent it touching the flesh. As soon as the skin is removed it must be put to soak in a weak solution of bleaching powder, then dried in the sun.

Decision concerning the meat should be made with the following principles in mind:—

If the animal was slaughtered at the beginning of its contamination, and if the organs and viscera are free from lesions, there is no reason to condemn the carcase, but it should not be consumed till after boiling in water, the latter being safely disposed of.

The other by-products should be preserved by covering with grease-proof paper, cellophane, etc., etc.

Foods contaminated by mustard gas in a powdered form should not be eaten until cooked in several changes of water. The action of mustard gas on foodstuffs is largely neutralised by prolonged exposure to the air, and no harmful effects are noticeable in the dog following its consumption.

Fish and fats can be consumed without danger, after contact with phosgene or HCN, provided they are aerated. But it must be borne in mind that, in practice, the cleansing of foodstuffs contaminated by various poisons presents two difficult problems—the difficulty of quick identification of the gas, and the establishment of duration of its contact with the food. That is why in doubtful cases drastic action is preferable to hesitation.

Individual Protection

The erroneous belief that horses possessed a natural resistance to gas was responsible for the

delay in individual protection of animals during the War. One cannot get away from the necessity of finding a mask for the horse, although other matters overshadowed this one in the last war. Of the makeshift methods originally used—nosebags filled with peat, vegetables, wool, vegetable products and rags soaked in a neutralising liquid—some were useful, but for various reasons (insufficient airtightness, obstruction of the nasal orifices, and brevity of protection) they proved themselves inefficient. In fact, the "inspiratory volume" of the horse in work does not allow of any mask offering resistance to inspiration, hence there was a tendency towards the adoption of a filtering apparatus, usually in the form of a sack. The Germans tried several designs, notably the Auer mask, which proved too big, too heavy, and involved too many modifications to the bridle, and was physiologically incompatible. Finally there was evolved an apparatus, based on the English pattern, fixed on the base of the neck, which could be rolled down over the horse's face almost completely covering the nostrils, but leaving the lower jaw free, and making bridle modifications unnecessary.

This permeable mask strengthened by copper around the top opening and soaked in the so-called "U" solution consisting of:—

Hexamethylene tetramine (urotropine), 175 grammes
Potash, 50 grammes
Water, 600 grammes

was made in three parts, each of which was contained in a metal box, fixed to the bridle or breast collar. This apparatus made it possible to use riding and draught horses in a gas zone.

The French, in March, 1916, used the Lunasse mask, and later, in 1917, the Decaux mask, which, unlike the German mask, covered both jaws.

The English mask was formed by a double sack of flannel provided with a lining of thin linen and another of oiled silk, made stiff to avoid obstruction of the nostrils in the event of a violent inspiratory effort and the neutralising liquid was one of the following: ammonia, glycerine, hexamethylene tetramine (urotropine), sodium carbonate or nickel sulphate, etc. Its effectiveness did not last more than an hour.

The Americans, inspired by the English mask, made use of two types, the second of which was composed of multiple sacks each having several linings of large-mesh material soaked in a neutralising substance, and while only provoking a slight respiratory discomfort, proved itself so useful that over 37,500 were manufactured.

Austria started comparatively late, at the beginning of 1917, in exploiting the individual protection of the horse.

Russia at the beginning of 1917 suffered heavy losses in horses and tried several masks until the model of Zavrinovitch and Gontareiv was found to provide a simple protection by covering the face and eyes and consisting of a double sack with a thickness of hay soaked in a neutralising solution interposed between the layers. No alteration was made to the bridle, but the reins running through special holes tended to decrease the airtightness, and its general introduction was slow.

The susceptibility of the eyes and skin of the horse to mustard gas is a problem which has been neglected till recently. The protection of the whole body being impossible, various attempts were made towards the protection of the limbs (bandaging the pasterns and cannons with strong bandage soaked in oil and varnish) ("American boots"), but this proved ineffective as much through lack of solidity as through its restriction of mobility.

The author goes on to recount the means of protection used in the last war for dogs and pigeons. The former wore a mask attached round the neck and underwent a vigorous course of training with it, and the latter were protected while in thin baskets, whilst after leaving them they passed through the layer of gas so quickly that no further protection was necessary.

Assuming that in many phases of a future war the horse will be indispensable, individual protection becomes a matter of paramount importance. Authors in other countries claim that the question has made some progress; Benevolensky in Russia has definitely announced that a mask has been produced which is proof against all the gases used in the Red Army, but, for obvious reasons, proof of this is not forthcoming. The latest Swedish mask, "M/29," is nothing more than a net filter similar to the German model used in the War, and is the same as the "Pigeon Cage A/29." If during hostilities doubts have arisen as to the efficiency of masks for horses, it would seem now that for any such failure the lack of instruction of men and training of animals should be blamed, rather than the defectiveness of the materials used. The excitement of men and terror of the animals are not conducive in surprise attacks at night, for instance, to the rapid fitting of protectors.

The German mask can reasonably be credited with guaranteeing reasonable protection for a limited time, and is of value only against such established gases as phosgene and analogous gases, but is not polyvalent. And it is this lack of polyvalence which represents the chief objection to all the liquid filters, not to mention the risk of freezing and of rapid desiccation. In fact, one cannot escape the fact that we are still almost completely in the dark on this subject. The advantages of dry and wet filters

have been known for a long time, but a really practicable apparatus for the horse with inspiratory and expiratory valves and a detachable filter, has yet to be found. Even assuming that such a mask would afford perfect protection, its application to general progress is faced with much greater difficulties than that of a similar one designed for man, owing to the reduced volume of the apparatus and the great respiratory capacity of the subject.

The author has established the following figures:—

Type of Horse	Respiratory Capacity	Pace
Rider	40- 60 litres	Rest
Rider	90-150 litres	Trot
Rider	220-250 litres	Fast trot
Rider	300-400 litres	Canter
Rider	500 litres	Gallop
According to Zuntz:—		
Light draught	300-450 litres	Normal work

Without aiming at perfection, the ideal mask for the cavalry horse would appear to depend upon the following: lightness, solidity, cheapness, easily folding, not cumbersome, easy to fit and to remove, and not offering obstruction to the normal play of the reins, and, above all, polyvalence. For the artillery draught horse a slightly heavier apparatus would be necessary.

A serious course of training is necessary both day and night, starting with an experimental mask and working up to the war pattern. Obviously the men must be trained to fit and remove these masks and in wearing their own.

With the dog, the fact that he perspires through his mouth complicates any mask because the contained air becomes hygroscopic. Also, inside a mask a dog loses his sense of hearing and must rely entirely upon his eyes.

Summarising, the author points out that, despite many hopeful schemes, it does not appear to be possible to protect the whole body of the horse against gaseous or liquid poisons. In fact, in the event of war the veterinary department can look forward to a busy time with these conditions. He suggests the issue of veterinary chests, "Anti-gas," containing instructions and directions as to the use of the contents.

The author concludes his work with encouragement to work along the right lines, not to lose sight of the importance of meat inspection in this special connection, and lays stress on the new problem of "collective protection." Towards this end the German Veterinary Services are endeavouring to attract the attention of the authorities to the necessity of spreading chemical, physiological and military knowledge throughout the officers of the Corps by way of the refresher courses and veterinary schools.

CLINICAL COMMUNICATION

Swine Erysipelas Affecting Sow and Litter

P. L. SHANKS and H. G. LAMONT
Veterinary Research Division, Stormont

The following clinical note is published as typical of a number of similar cases with which we have met and which emphasises the importance of farmers arranging for their veterinary surgeon to visit their sick animals.

History.—A farmer left the body of a small piglet, a few days old, in his veterinary surgeon's office with a request for a *post-mortem* examination and advice! The veterinary surgeon was out on a case and on his return brought the piglet with him to the laboratory at Stormont. He was unable to supply any information. *Post-mortem* examination showed gastritis and enteritis. The mucous membrane of the caecum and large intestine was of a faint greenish colour and had a morocco leather-like appearance. There was necrosis and slight diphtheresis. Smears from the intestinal lymph glands showed slender Gram-positive bacilli typical of swine erysipelas bacilli. A tentative diagnosis of swine erysipelas was returned and a pigeon was inoculated. (The pigeon died on the fourth day from septicaemia caused by *Erysipelothrix rhusiopathiae.*) One of us visited the farm in company with the veterinary surgeon, when we discovered that the sow was affected with swine erysipelas. The following facts were ascertained.

The owner noticed the sow lame before farrowing but attributed the lameness to rheumatism. The sow farrowed twelve living pigs and four days later became acutely ill with a temperature of 108°. "Spots" appeared on the skin. These spots were typical of swine erysipelas skin lesions. Illness in the piglets was noticed and coincided with the appearance of symptoms in the sow and one piglet died within 24 hours of showing symptoms. In all, seven piglets died. The five which survived were all ill and one of them showed skin lesions. The sow and five piglets recovered under serum treatment.

"Experiments have been made with cows and gas masks, but have not been very successful, as the cows promptly ate the gas masks," said Mr. H. V. Cope (Area Organiser for North Devon for Air-Raid Precautions) when giving an explanation to members of the Barnstaple Farmers' Union on the duties of farmers under the A.R.P. scheme. He added that the only thing that could be done at the moment should there be gas about, was to get the livestock on to as high a place as possible.

The Veterinary Record

July 2nd, 1938.

The Care of Animals in Chemical Warfare

IT is regrettable that preparedness for chemical warfare has become important to the Nation. The organisation of A.R.P. services is being vigorously pursued throughout the land, but we have, as yet, heard little of the services proposed to ameliorate the effects of air raids upon animals. This country not only possesses a density of human population above the average but that of its animals is also above the normal. In country districts, particularly in certain areas, cattle, sheep and pigs abound whilst the dog and cat population is high in our towns and horses are still present in large number in certain regions. It would seem that in any scheme developed to mitigate the effects of gas attacks by air there should be some organisation capable of directing the best disposal of animals during the raids and of giving treatment to those animals that become affected.

Many problems need consideration in the establishment of such an organisation. Should domestic pets be taken to gas proof shelters with their owners, or should they be given shelters of their own? A decision on such a point has to be made after considering all points of view, including the effect of worried and perhaps howling animals upon human beings already living under abnormally tense conditions. Yet to leave the animals loose in houses or roads during a raid may result in further danger due to the free movement of such animals as become contaminated. The decontamination of the hairy skins of animals is indeed itself a task of some difficulty.

In the country the problems of protection during raids are not so grave as it would seem that no place is safer than the open country, particularly if hollows are avoided and access to pools of water is guarded against.

The treatment of illness due to poison gas is not easy as different gases require different treatments. Indeed, one of the difficulties is to make a quick identification of the gas and establish its duration of contact. A guiding principle, however, is to treat every case as if it were severe.

In order to give our readers some information on these points we publish in this issue an extended review and some abstracts dealing with these and other relevant problems, such as the protection of food and the procedures to be adopted if it becomes contaminated. We hope this information will enable veterinary surgeons to apply their knowledge to local conditions and perhaps submit schemes to their local authority.

AGRICULTURAL RESEARCH COUNCIL

The committee of the Privy Council for the Organisation and Development of Agricultural Research have appointed Lord Radnor and, after consultation with the President of the Royal Society, Sir Joseph Barcroft to be members of the Agricultural Research Council with effect from July 1st, when Lord Richard Cavendish and Sir Frederick Gowland Hopkins retire from membership of the Council. On that date, as already announced in these columns, Sir Thomas Middleton will succeed Lord Richard Cavendish as Chairman of the Council.

Lord Radnor is Lord Warden of the Stanneries, Chairman of the Lawes Agricultural Trust, and a member of the Council of the Royal Agricultural Society of England. Sir Joseph Barcroft is a Fellow of King's College, Cambridge, Emeritus Professor of Physiology in the University of Cambridge, and was formerly Fullerian Professor of Physiology in the Royal Institution.

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DAIRY BYE-LAWS

The proposal that the administration of dairy bye-laws should now be in the hands of the Ministry's Veterinary Service instead of resting with the county and local sanitary inspectors has been made by the Central Executive of the National Farmers' Union of Scotland to the Ministry of Agriculture. Uniformity of action and efficiency was the aim of the Government in establishing the State Veterinary Service, and this organisation were unanimously agreed that these ends could, in addition, be usefully served in so far as dairy bye-laws were concerned. The committee did not feel that the fact that there would require to be a certain measure of control by the officers of the Ministry in Scotland constituted an insuperable difficulty.

ABSTRACTS

[**Body Temperature Control and Physiological Reactions During Muscular Work in Gas Protective Clothing.** Crowden, G. P. [Major, R.A.M.C. (T.A.)] (1938.) *Jl. R.A.M.C.* March to April, 1938. 10 figs., 3 tables.]

When gas protective suits of oiled silk or oilskin are worn during the performance of muscular work, body-heat progressively accumulates and capacity for such effort rapidly declines. In this paper are recorded the particulars and results of laboratory experiments and field tests to determine the temperature levels and gradients between the skin and layers of clothing worn, and to assess, by observation of physiological reactions, the effectiveness of various measures calculated to facilitate body-heat loss during the performance of muscular work when wearing gas protective clothing and equipment.

The first laboratory experiment showed that drying the expired air by $CaCl_2$ and admitting it to the protective suit was worse than useless, but the effect of applying wet cloths to the outside of the suit was so drastic in the instantaneous relief it caused that it proved the value of such a measure for first aid in impending heat collapse when for fear of contamination with mustard gas, it may not be advisable to remove the protective clothing. This experience led to experiments to test the effectiveness of (1) a wet fabric outer garment worn over the Service gas protective suit; (2) cooling by wet fabric-faced protective clothing. The latter was found superior: the free evaporation of water which takes place from the wet outer surface increases body-heat loss provided the wet surface is in close apposition to the gas impermeable layer of the protective clothing.

As a result of the field tests, carried out on a number of subjects working under conditions of temperature and humidity as high as are likely to be encountered in the English climate, it is concluded that if the outer surface of protective clothing is maintained wet during the performance of muscular work, then the accumulation of body-heat is prevented, sweating is much reduced and the risk of heat collapse, even under arduous labour and hot summer conditions, is eliminated. Any of the three protective outfits described, when used wet as recommended, are notably superior to Service protective clothing consisting of oilskin only.

W. B.

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[**Phosgene Poisoning in the Horse.** (Trans. title.) Hasskó, A. (1938.) *Tierärztl. Rdsch.* **44.** 9. 140-144.]

An exposure of ten minutes to air containing 135 mg. phosgene per cubic meter proved fatal to a horse in two hours. The first symptoms, 23 minutes after exposure, were rapid respirations and perspiration. Breathing became worse until an extensive flow of blood occurred from the nostrils and death quickly followed. Recommended treatment (bleeding and injection of 5 per cent. calcium chloride) was employed unsuccessfully as soon as symptoms appeared.

An exposure of five minutes to air containing 20 mg. phosgene per cubic meter proved rapidly fatal to hens, similar respiratory symptoms preceding death. The author suggests that hens could be used to detect small concentrations of phosgene in the air.

A. T. P.

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[**Debatable Tumours in Human and Animal Pathology.** (Part II.) Dawson, E. K., Innes, J. R. M., and Harvey, W. F. (1937.) *Edin. Med. J.* N.S. (IV.) **44.** 645-651. 29 photomicrographs.]

The second paper of this series deals with the *lymphosarcoma* or reticulum-cell sarcoma, which is defined as a radio-sensitive tumour of lymphoid tissue, arising from the embryonal stem-cells of that tissue.

Lymph nodes, such as those of the neck, mediastinum and retroperitoneal tissue, are common sites for the growth but it is liable to occur, either as a primary or secondary, in any situation where there is lymphoid tissue, its residues or the lymphoid parent cell, *viz.*, tonsil, nasopharynx, thymus, gastro-intestinal tract and more rarely, thyroid, spleen, bone marrow, lung, liver and kidney.

Microscopically, the normal general architecture of the lymphoid tissue is effaced by a sheet of evenly dispersed cells which are always larger than the small lymphocyte. They are polyhedral, ovoid or spheroidal, with a variable amount of cytoplasm and a vesicular nucleus in which there may be a central nucleolus, though more commonly there are two or three large, separate chromatin nodes. The presence of mitoses is a characteristic and invariable feature. Giant cells are rare: if present, they are large cells with a single, bulky, hyperchromatic nucleus. Argyrophile reticulum fibrils form a scaffolding for the tumour cells. Extension to neighbouring nodes is common and quite a characteristic of lymphosarcoma. Surrounding tissues may be invaded by direct extension and in addition metastases may follow blood carriage of tumour emboli.

On the basis that the lymphosarcoma is a malignant growth of undifferentiated or little differentiated mesenchymal cells persisting in the loose areolar, myeloid, sinusoid and lymphoid tissue, the authors refuse to class the "lymphoma" (so-called "small round-cell

sarcoma"), which consists of a uniform production of differentiated small lymphocytes, as a member of the lymphosarcoma group.

Of importance in differential diagnosis are cellular infiltrations of organs in leukaemia, reticulum-cell hyperplasia of inflammatory origin, epidermoid carcinoma and Hodgkin's lymphogranuloma, all of which are briefly discussed. Mycosis fungoids and "Ewing's tumour" may also be regarded as probably reticulum-cell sarcomas.

J. W. W.

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[**Debatable Tumours in Human and Animal Pathology,** (Part III.) Innes, J. R. M., Harvey, W. F., Dawson, E. K. (1938.) *Edin. Med. J.* N.S. (IV.) **45.** 36-42. 34 photomicrographs.]

The commonest tumour of the testis, the *seminoma*, which is described in this paper, is a radio-sensitive tumour derived from precursor cells of the spermatogonium of the testis. In general microscopic appearance, the tumour consists of sheets or bands of uniform epithelial cells of medium size and spheroidal or polyhedral shape. Dividing the cells into small or large groups is a fine, argyrophil, fibrillary stroma which merges into the thick collagenous bands responsible for gross lobulation of the growth. The reticulum fibrils are rarely intercellular. As in the lympho-epithelioma, an important feature is the close relationship of small lymphocytes with the epithelial tumour cells among which they lie in small or large groups. The rate of growth may be slow or rapid: necrosis and haemorrhage are common.

The tumour cell is an immature, undifferentiated, epithelial cell with a hyperchromatic nucleus of the vesicular type. It is said to be rich in glycogen.

The growth is believed to originate from the seminiferous tubules, with secondary involvement of the mediastinum testis and rete testis. Metastasis by way of the lymphatics gives secondaries first in the para-iliac and para-aortic lymph nodes. The inguinal nodes are not affected unless the resistance to invasion and rupture of the tunica albuginea is overcome.

In discussing the relationship of the seminoma to the teratoma, the authors give it as their opinion that separation of the two types closely approximates a distinction without a difference, on the basis that all tumours are developed from those undifferentiated embryonal cells which persist as such in adult life. The earlier the embryonal age of the tumour stem cell, the greater its range of differentiated tissue formation. Thus the teratoma, being derived from undeveloped, dormant germinal epithelium, is a tumour usually of many tissues or organoid structures, while the seminoma is simply an embryonal carcinoma arising from the undifferentiated epithelium of the seminiferous tubules. Seminoma tissue may be a component of a teratoma.

Of other tumours of the testis, all adenoid and neuro-epithelial types are classed as teratomas, while the position of the large, clear cell type sometimes diagnosed hypernephroma, sometimes interstitial cell tumour, at present remains uncertain.

J. W. W.

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[**A Mixed Parotid Tumour in a Horse.** (Trans. title.) Baumann, R. (1938.) *Wien. tierärztl. Mschr.* **25.** 4. 101-103.]

A record of a tumour of a type very rarely encountered in animals, although not uncommon in this situation in man. An encapsulated mass, weighing 470 grammes, was found below the base of the right ear of a horse, and was easily removed by operation.

The essential structure of the neoplasm consisted of epithelium either differentiated to form acini or present as solid cell columns, some of which consisted of keratinising squamous epithelium. The stroma of the tumour was in parts converted to metaplastic bone.

There was no recurrence after removal and the tumour resembled the benign variety of parotid tumour found in man.

E. G. W.

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[**A National Instrument for Veterinary Obstetrics.** (Trans. title.) Malgarini, G. (1937.) *Clin. Vet. Milan.* **60.** 2. 110-115.]

An instrument designed to replace the obstetrical implements imported into Italy is described. It consists of a rigid steel tube about 90 cm. long, in two sections which can be disjointed for transport. The distal end carries a laterally compressed cup into which fit two curved rods terminating in rounded buttons. These rods are connected by a cable running through the tube to the handle where they are connected to a screw. The handle is also fitted with a curved side piece, like a sabre hand guard, to assist the grip and to facilitate torsion. When the cable is tightened by the screw the hooked rods are drawn into the distal cup and are thus closed, enabling them to grip on to the nasal septum, an ear or other part which it is wished to hold. It is claimed that the instrument can be used for traction, torsion or propulsion of the foetus and can be easily disinfected.

U. F. R.

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[**A Change Produced in Eggs by the Ingestion by Fowls of Cotton Flour.** (Trans. title.) Lahaye, J., and Saintmoulin, L. de. (1937.) *Ann. Méd. vét.* **82.** 7. 289-304.]

The authors' attention had been drawn by a poultry keeper to the sudden stoppage of egg-

laying by his hens. The number had fallen from 86 per day per 160 hens—White Leghorns —to 35 and was diminishing still further. It was found that the eggs had undergone a curious change. The shell appeared normal but the albumin was of a very watery consistency and discoloured. In addition, throughout the yellow were to be found large dark-brown or black patches, irregular in shape and not unlike the appearance of putrefaction. It was considered likely that the ration was the cause of the trouble, especially as the dry-mash contained cotton flour. Feeding trials were carried out in order to prove this hypothesis. It was found that a large percentage of the eggs of poultry fed a mash containing 5 per cent. cotton flour were of the type described above and that if the amount of the flour was increased to 15 per cent. practically every egg was of this description. Further experiments carried out in order to discover which constituent of the cotton flour was the cause of the trouble produced no conclusive results.

J. S.

REVIEW

[**The Story of the Horse.** By Major A. J. R. Lamb, D.S.O. (MacLehose, 12s. 6d.]

This is a first-rate book. It traces the history of our "firstest friend" from the earliest known times. The gradual evolution of the English thoroughbred from existing native stock by crossing with Arab and Barb imported sires is very well described. This might be termed the underlying theme of the book, and round this axis revolves a fascinating story implicating almost every known breed and strain of horse.

Our only criticism is directed to the publishers. We regret they lacked the courage to publish the book at a more popular price, for it is just the book for the present-day veterinary student, and if they are as impecunious a race as they were in the reviewer's day, the sum of twelve shillings and sixpence may seem a little out of the reach of the very people we would wish to possess the book.

The book is well got up and the illustrations are apt and generous in number. We shall look for further (and cheaper!) editions with pleasure.

The Viceroy has received at Simla the gift of a bull, a cow and calf, of the Afghan hill breed from the Prime Minister of Afghanistan, who has also presented two bulls for breeding purposes to the Imperial Veterinary Research Institute at Muktesar. The Viceroy is presenting in return a fine specimen of the Punjab breed of bull.

VICTORIA VETERINARY BENEVOLENT FUND

GENERAL MEETING OF MEMBERS

A General Meeting of Members of the Victoria Veterinary Benevolent Fund was held at the Royal College of Veterinary Surgeons, 10, Red Lion Square, London, W.C.1, on Thursday, June 2nd, 1938, at 12.25 p.m., immediately following the Annual General Meeting of the Royal College of Veterinary Surgeons. Lieut.-Colonel J. W. Brittlebank, President, occupied the Chair and there were present: Mr. A. Blake, Professor J. B. Buxton, Major G. W. Dunkin, Messrs. G. H. Livesey, J. W. McIntosh, Major H. Mason, Captain J. W. Procter, Lieut.-Colonel P. J. Simpson, Mr. Arnold Spicer, Colonel G. K. Walker, Mr. William Woods, Professor G. H. Wooldridge and Lieut.-Colonel T. Dunlop Young.

The Secretary read the notice convening the meeting and announced that apologies for absence had been received from the following: Major F. L. Gooch, Mr. J. Willett, Mr. W. Jackson Young, and several members of the Council.

The minutes of the previous General Meeting were taken as read and were confirmed and signed as correct.

Election of Officers

President.—The President: I should like to say that I have occupied this position for a good many years and I shall not be in the least hurt if another President is proposed.

Colonel Young: I hope that you will go on occupying it for a great many more years.

Professor Wooldridge: In spite of what our President has said, I am going to take the liberty of proposing that he be re-elected President of the Fund. I know of no one who gives so much time and careful thought to this work, which are very necessary for the administration of this Fund. We should lose very greatly indeed if we lost his services now, and I am sure it is the wish of all of us that he should continue in the Chair.

Colonel Young seconded the motion, which was then put by Professor Wooldridge and carried unanimously, with acclamation.

The President: Thank you very much. I propose to continue to do the best I can for this great and glorious work.

Vice-Presidents.—The Secretary: The present Vice-Presidents are: Mr. G. P. Male, Captain J. R. Rider and Professor G. H. Wooldridge. Dr. Bradley was also a Vice-President, and there is a vacancy due to his death.

Lieut.-Colonel P. J. Simpson: I beg to propose the re-election of Mr. G. P. Male, Captain J. R. Rider and Professor G. H. Wooldridge as Vice-Presidents.

Mr. McINTOSH seconded the motion, which was carried unanimously.

The PRESIDENT: To fill the vacancy due to the death of Dr. Bradley, I should like to propose from the Chair that Professor Buxton be elected a Vice-President.

Mr. McINTOSH seconded the motion.

The PRESIDENT: Is there any other proposal? If not, I put to the meeting that Professor Buxton be elected a Vice-President of the Victoria Veterinary Benevolent Fund.

The motion was carried unanimously.

Honorary Secretary.—The PRESIDENT: There is only one Honorary Secretary and you do not want me to make a speech about him. You all know the work that Colonel Simpson does; he carries the Society on his back. I beg to propose, therefore, that he be re-elected Honorary Secretary.

Professor BUXTON seconded the motion, which was carried unanimously, with acclamation.

Lieut.-Colonel SIMPSON: Thank you very much indeed. I will try to carry on with the help of the President.

Honorary Treasurer.—The PRESIDENT: Here again we have a singularly expert man for this position in Mr. Arnold Spicer. He is a hard taskmaster for those of us who hold office. I do not think that he thinks much of us, but we think a great deal of him, and I should like to move from the Chair that Mr. Spicer be re-elected Honorary Treasurer.

Mr. McINTOSH seconded the motion which was carried unanimously.

The PRESIDENT: Mr. Spicer, you are elected as Treasurer and critic!

Mr. SPICER: Thank you. I shall try to criticise intelligently!

Auditors.—On the motion of Mr. LIVESEY, seconded by Colonel YOUNG, Messrs. Wilkinson, Chater and Co., were re-elected Auditors to the Fund.

Annual Report and Statement of Accounts

The SECRETARY: The annual report has been circulated to every member of the Fund and contains on pages 7 to 11 a brief summary of the work of the year.

The PRESIDENT: You will see that the various investments and trusts are set out separately. There is a vast amount of detail here which has all been carefully audited and found to be correct.

On the motion of Mr. McINTOSH, seconded by Professor BUXTON, the annual report and statement of accounts were received.

The PRESIDENT: The report is now open for discussion. I do not know whether you wish to take it page by page; probably most of you are familiar with its contents. One prominent feature is that as usual we are spending more than we receive, but the calls on us are many and heavy. I want you particularly to notice the wonderful work done by the ladies. They have been magnificent in their efforts to help and this is a movement which I am glad to see is spreading, so that I think in time to come the work of the women of our profession will entirely outweigh that done by the men. You will notice that a very small proportion of the practising members of the profession are subscribers to the Fund, there being only 464 subscribers. I think I am correct in saying that in no single instance was the parent or husband of those who are receiving help from the Fund a member of it. I should like to mention also that the Fund works in very close harmony with the National Veterinary Benevolent and Mutual Defence Society; there is no overlapping.

Professor WOOLDRIDGE: I should like to endeavour to emphasise the necessity for a greater number of members of the Fund and for more contributions to it. As the record of this meeting will be published I should like to suggest that the very excellent circular which was sent round to the profession should again be published in the report of this meeting.* It puts the position very clearly, and I feel that many members of the profession may not yet have realised what is really expected of them and what should be regarded as a duty on their part, namely to look after their brethren in distress.

I move that the report and statement of accounts be received and adopted.

The PRESIDENT: I think that Professor Wooldridge's suggestion is an excellent one.

Professor BUXTON seconded the motion which was carried unanimously.

Election of Ten Members of the Association to Serve on the Council

The PRESIDENT: We have now to elect ten members of the Association to serve on the Council.

The SECRETARY: The present members are given on page 4 of the report.

The PRESIDENT: Professor Buxton has been promoted to be a Vice-President, and there is therefore a vacancy. I should like to propose that Mrs. W. G. Wragg, a very active member of the Ladies' Guild, be elected to fill that vacancy.

Professor BUXTON: I shall have very great pleasure in seconding that. Mrs. Wragg has played a most prominent part in the activities of the Ladies' Guild. She is tireless in her efforts, and has this work of the Benevolent Fund very much at heart. I am quite sure that we could not make a better selection as a representative of the members of the Fund.

*See termination of this report.—*Editor.*

The President: If there are no other nominations, I will propose the re-election of Messrs. F. L. Gooch, G. H. Locke, A. Mackenzie, Mrs. M. Nickinson, Messrs. J. Willett, William Woods, W. G. Wragg, T. Dunlop Young and W. Jackson Young and the election of Mrs. Wragg.

Professor Buxton seconded the motion, which was carried unanimously.

Other Business

The Secretary: I have an explanation to make with regard to the report. I should like to point out a printer's error on page 34, five lines from the bottom, where there is the entry "Scottish Metropolitan V.M.A., £6 16s. 4d." That should really be the Scottish Branch of the National Veterinary Medical Association. Our records are perfectly correct and we have not been able to discover how the error came to appear in the printed report.

Votes of Thanks

Professor Wooldridge: Before the meeting closes, I should like to propose a very hearty vote of thanks to our officials, who have been so attentive to the enormous amount of work which they have had to do during the year. I would point out to the members of the Fund that the reports of meetings published from time to time in the *Record* only touch the very fringe of the work done by the officials, who are tireless in investigating claims to see that all who are deserving are helped and that the meagre funds are as equitably distributed as possible. Their work deserves a very special vote of thanks.

The vote of thanks was carried by acclamation.

The President: We thank Professor Wooldridge very much and I should like to supplement what he has said by saying that we must also thank Dr. Bullock and Mr. Francis particularly for their very kind and very devoted service. (Applause.) Three or four days a week I hear something from Dr. Bullock and the amount of work which he does, with the assistance of Mr. Francis, is really enormous.

I thank you very much for your attendance.

On the motion of Professor Buxton, seconded by Colonel Young, a cordial vote of thanks was accorded to the President for his conduct in the Chair, and the meeting then terminated.

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The following is the circular referred to by Professor Wooldridge and we commend its appeal to our readers:—

Victoria Veterinary Benevolent Fund
10, Red Lion Square,
London, W.C.1.
May, 1938.

Dear Sir/Madam,

If you are not already a subscriber to this Fund, may we make a very earnest appeal to you to help us? *Our needs are indeed urgent.* We are at this moment giving grants—of necessity inadequate—to more than 50 persons closely connected within the profession who are in an almost destitute condition. In many cases the small grant we make cannot suffice to provide them with more than the bare necessities of life.

The people on whose behalf we appeal are mainly widows of veterinary surgeons. Of these, some are comparatively young, and left with no private means or other help, and faced with the responsibility of feeding, clothing and educating a young family.

The majority are widows over 60 without any income, except in the case of those over 70, who are entitled to the Old Age Pension of 10s. a week. Life at such a low level is more trying to women who have known better days, and the Council of the Fund would like to be in a position to give a little extra assistance in several cases, especially where there are children. New applications are constantly being received, but every new grant, even of so small a sum as 10s. a week, means that we must secure another 50 subscribers. Will you be one of these? We can assure you that every application is closely scrutinised, every enquiry is made, and no grant is given until the Council is satisfied that it is deserved. Even with the strictest economy the grants made last year exceeded our income by nearly £140.

Please do help us in this work of attempting to alleviate the hardships that have fallen on those, who, through no fault of theirs, find themselves helpless and almost hopeless.

The minimum membership subscription is 10s. 6d. a year, payable to the Victoria Veterinary Benevolent Fund, and should be sent to the Secretary at the above address.

Yours faithfully,

J. W. Brittlebank, *President.*
Arnold Spicer, *Hon. Treasurer.*
P. J. Simpson, *Hon. Secretary.*
Fred Bullock, *Secretary.*

In the past three seasons a great deal has been learned on the subject of the comparative value of dried grass and other concentrated or semi-concentrated foods, and it is now possible to review the position from the points of view of equipment, cost, storage and economic use. The Agricultural Research Council have published, at 2s. 3d. post free (H.M. Stationery Office), an important study which should prove very helpful to all to whom this modern development is of interest.

N.V.M.A. DIVISIONAL REPORT

Yorkshire V.M.S.*

MEETING AT LEEDS

A General Meeting of the Division was held in the Hotel Metropole, Leeds, on Friday, May 27th, 1938, when the President, Mr. W. R. McKinna, M.R.C.V.S., D.V.S.M., occupied the Chair.

The members present were, Messrs. F. C. Scott, J. A. Dixon, J. W. Procter, T. C. Hall, W. A. Campbell, J. M. McKellar, E. Ackroyd, G. W. Davidson, and A. J. Adams (Hon. Secretary). Mr. G. S. Donaldson was present as a visitor.

The receipt was intimated of apologies for absence from Messrs. D. S. Rabagliati, G. C. Barber, R. S. Smythe, G. V. Tyerman, A. H. Watson, J. Cochrane-Dyet, and W. T. MacGregor.

The minutes of the last meeting, having been published in the *Veterinary Record*, were taken as read and adopted.

Correspondence

The following correspondence was submitted by the Secretary:—

Report of Poultry Technical Committee.—The receipt of a letter dated April 14th, 1938, from the General Secretary, N.V.M.A., was intimated. The letter informed the Society that the Poultry Technical Committee advised the formation of panels of veterinary surgeons with specialised knowledge of poultry diseases. The Council, N.V.M.A., is therefore of the opinion that each Division should organise short refresher courses in Poultry Husbandry and Disease Control.

The Secretary informed the meeting that this matter had been discussed at the last Council meeting of the Division, and that he had been instructed to write to Mr. Lyle Stewart, M.R.C.V.S., of the Armstrong College, Newcastle-on-Tyne, to ask him if he would be prepared to give a course of lectures on Poultry Disease Control. Mr. Lyle Stewart in answering the Secretary's letter replied that he would be prepared to give one or, if thought necessary, two lectures.

After discussion, it was proposed by Mr. Procter and seconded by Colonel Dixon, that the Council be given the power to co-opt Mr. J. O. Powley and to arrange a suitable course of lectures. In seconding the motion, Colonel Dixon said that he thought the Ministry of Agriculture and Fisheries ought to be asked to help in the formation of the course of lectures.

*Received for publication June 3rd, 1938.

Cancer Research.—A letter, dated March 7th, 1938, from Professor Passey of the Department of Experimental Pathology and Cancer Research, was considered. Professor Passey asked if members would bring to his notice any cases of cancer in dogs and cats and also cases of pigs suffering from "rheumatism."

Leeds R.S.P.C.A. Clinic.—A letter, dated May 16th, 1938, from the General Secretary, N.V.M.A., was considered, in reference to the delay shown by the committee of the Leeds Branch R.S.P.C.A., in approaching Mr. Crawford, nominee of the Yorkshire Division to serve on the committee. After a short discussion the meeting arrived at no decision.

Resignation.—It was decided to accept, with regret, the resignation of Mr. E. G. Duncan, late of Settle.

Election of New Members.—Messrs. G. S. Donaldson, Huddersfield; P. Fernie, Pickering, and K. Stuart, Malton, were elected members of the Society.

Election of Secretary.—The retirement of Mr. W. T. MacGregor from the Secretaryship was announced by Mr. McKinna, who said that additional work and responsibility as Divisional Inspector had forced Mr. MacGregor to tender his resignation.

Mr. A. J. Adams was then proposed as Secretary by Mr. McKinna and seconded by Mr. Procter.

Mr. McKinna spoke of the good work done by Mr. MacGregor as Secretary and suggested that the new Secretary be asked to write a letter of appreciation to Mr. MacGregor, thanking him for his work.

N.V.M.A. Council.—The following members were elected to represent the Division on the Council, N.V.M.A.: The President, Mr. McKinna (proposed by Colonel Dixon, seconded by Mr. McKellar) and Mr. Watson (proposed by Mr. McKinna, seconded by Colonel Dixon), together with the Hon. Secretary (*ex-officio*).

Clinical Discussion

Mr. F. C. Scott opened the clinical discussion with an account of a case of what he took to be elder plant poisoning in cattle. He said that the cattle in question, after showing a short period of illness, made manifest by little more than dullness and salivation, died suddenly. Examination of the pasture showed that elder plant had definitely been eaten.

Mr. Scott then asked if any of the members present could give him any advice on the following case of sudden death in three horses on the one premises. The horses, after showing dullness and salivation, with occasional signs of colic, with violence in one, had died within 24 hours. *Post-mortem* examination revealed the contents of the stomach, small intestine and

caecum to be liquid. The colon was firmly impacted with faeces, black on the surface, and adherent to a non-inflamed bowel wall. The right heart was distended. Did the members think these were cases of acute grass sickness?

Continuing Mr. Scott sought information regarding cases of toxaemia in foals. He was not concerned with the case of the foal which would not suck, nor with the foal with hard, bullet-like faeces, nor the same associated with abdominal pain, but with the foal which was normal for 24 hours and abruptly became recumbent and died within twelve hours. Mortality was almost 100 per cent. Occasionally the foal was well for a week and then came collapse and death. *Post-mortem* lesions were usually indefinite. The condition would appear to be of a septicaemic nature but was non-febrile. As treatment Mr. Scott had tried blood injection, Lang's treatment, and prontosil, with disappointing results. It would appear from the failure of prontosil that the condition was not due to cocci.

Mr. Scott then went on to describe his method of blood sampling. He used the mammary vein in milk cows, but the jugular vein in heifers and horses.

In concluding, he exhibited some of the instruments which he favoured. Among these were: Needles specially ground for blood sampling; an enema syringe adapted to fit hypodermic needles (which he used for the injection of calcium gluconate solution in the treatment of milk fever), McLean's teat knife and Hudson's teat instruments.

Mr. Procter mentioned a similar instance of sudden death in horses. This involved some hunters at grass: he had lost four horses in the one week. They had died after an illness of 12 to 24 hours. Nothing to account for the sudden death was found at *post-mortem* examination. The symptoms manifest during the short illness were torpidity of the bowels, patchy sweating, and temperature 102°. The pulse was good. In his opinion these cases and those mentioned by Mr. Scott were probably grass sickness.

He had had cases of backward week-old foals which showed cyanosis of the mucous membranes. These cases he associated with a permanent foramen ovale. With reference to the taking of blood samples, Mr. Procter said that he preferred the jugular for the reason that it was so accessible. Moreover, he thought it inadvisable to interfere with a vessel which served such an important organ as the udder.

He was in accord with Mr. Scott's opinion of the teat instruments. The great thing was to avoid haemorrhage: there was always some perforation of the membrane across the base of the teat: if this could be found with the trocar, the corkscrew should be guided through and by this means the membrane might be ruptured with very little bleeding. In these cases it definitely did pay the farmer to call in his veterinary surgeon.

In cases of freshly damaged teats he found great success in simply bandaging the teat with elastoplast, leaving the bandage on for about ten days, and giving instructions not to milk any more than necessary.

Mr. Campbell, in continuing the discussion, said he was rather surprised that Mr. Scott blamed elder plant for poisoning his cattle. It was known that cattle could and did eat this plant in autumn with no ill effects. However, he thought that some form of poisoning was the cause, for, he said, many of the unaccountable deaths in animals were due to poisons of which the veterinary profession were ignorant.

He did not think the cases mentioned by Messrs. Scott and Procter were grass sickness. One did not get so many cases of that disease at one time on the same premises.

He thought that deaths often occurred in foals that were just backward, and which, although carried to full time, appeared to be premature. The bowels were working but the foals never seemed to thrive. He suggested that death was due to meningitis associated with joint-evil.

Mr. Ackroyd suggested that part of the trouble during this spring might be caused by the extremely dry grass. He had been recently called out to examine seven cattle, four of which were down. He treated for stomach staggers with complete success.

The President (Mr. McKinna) said he did not come across much toxaemia in foals, but, as considerable loss in lambs was due to organisms of the welchii group, might not these organisms be implicated in toxaemia in foals? Continuing, he described a new instrument which he used for the injection of calcium gluconate solution. This instrument consisted of a rubber nozzle which fitted over the neck of the bottle containing the solution. A valve is mounted on the nozzle and also a length of rubber tubing to which the needle is attached.

A short discussion on the Docking and Nicking (Prohibition) Bill followed. Mr. Campbell asked if permission had to be obtained before a damaged tail could be removed; if so, why not also for the enucleation of an eye, or any other surgical operation?

In conclusion, Mr. McKinna thanked Mr. Scott for giving the lead in the discussion.

Any Other Business.—It was decided, owing to poor attendance in the past, that no summer meeting would be held this year.

A. J. Adams, *Hon. Secretary.*

In Parliament

The questions and answers recently recorded in the House of Commons included the following:—

Gas in Warfare

Mr. C. Wilson asked the Home Secretary whether he can explain the terms true gas, persistent gas and contaminating gas, and give a list of each?

Mr. Lloyd: The term "gas" in warfare means any chemical substance, whether solid, liquid or vapour, which is used because it produces poisonous or irritant effects upon the human body. A "true gas" is a substance which is gaseous at ordinary temperatures. A "persistent gas" is usually a liquid at ordinary temperatures but evaporates slowly, giving off dangerous vapour. A "contaminating gas" is one which remains on an object or person and necessitates special treatment for the removal of it.

The best known examples are:—

True gases—chlorine, phosgene.
Persistent gases—mustard gas, many lachrymatory gases.
Contaminating gases—mustard gas, lewisite.

Particulars regarding each of these gases will be found in the Air-Raid Precautions Handbook No. 1.

. . . . . .

Foot-and-Mouth Disease (Vaccine Experiments)

Sir J. Leech asked the Minister of Agriculture whether he is conferring with the Danish Government as to the results of the foot-and-mouth vaccine experiments at Riems Island; and whether His Majesty's Government are testing the efficacy of the vaccine?

Mr. W. S. Morrison: I have seen reports on the active immunisation of animals against foot-and-mouth disease in Germany. In a preliminary scientific account that has been published, no details are given of the methods of preparation of the vaccine, but it is stated that they will be published in the near future. The results of the use of the vaccine in the field will also be published later. The Foot-and-Mouth Disease Research Committee is aware of the work which has been carried out in Denmark and its recent application in Germany, and is keeping in touch with the situation.

. . . . . .

Rejected Bulls

Mr. Hopkin asked the Minister of Agriculture whether he is aware of the hardship inflicted on the farmer who has a bull which is rejected as unsuitable for being licensed for stock purposes, in that the farmer is prohibited from taking such a bull to a mart to be sold; and will the Minister consider amending the Act to make it permissible for the farmer to sell such a bull at a public mart with proper safeguards as to the subsequent slaughter of the animal?

Mr. W. S. Morrison: Under the existing procedure a farmer owning a rejected bull which he does not wish to castrate is required to move the bull direct to a slaughterhouse. While I can understand the desire of a farmer to avail himself of such competition as would be afforded by the sale of the animal in a public market, the hon. Member will appreciate that the object of the Licensing of Bulls Act would be defeated if such a bull were sold at a market and were not immediately slaughtered thereafter. I have recently reviewed the existing procedure and have come to the conclusion that the provision of the safeguards which would be necessitated by the procedure suggested would be impracticable on grounds of administrative difficulty and expense.

. . . . . .

Dogs (Quarantine Regulations)

Mr. Messer asked the Minister of Agriculture whether he will consider a relaxation of the quarantine regulations which are strictly enforced on individual owners of dogs coming into this country, in view of the special treatment afforded to foreign owners of dogs trained for public performances, by which they can escape quarantine by giving an undertaking to keep their dogs in confinement?

The Minister of Agriculture (Mr. W. S. Morrison): Every dog imported from abroad is without exception required on landing to undergo a period of six months strict isolation on premises approved by the Minister which must not be the premises of the owner of the dog. Dogs, other than performing dogs, must be detained for the prescribed quarantine on the premises of a veterinary surgeon. Those imported expressly for public performances are required to be isolated either on the premises of the theatre where they are engaged to perform, if proper accommodation exists there, or on veterinary premises, subject in either case to frequent inspection. I am satisfied that no relaxation of these regulations would be justifiable.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

July 4th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

July 6th.—Summer Meeting of the Eastern Counties Division, N.V.M.A., at Fakenham, 2 p.m. (lunch 1 p.m.).

July 11th & 12th.—N.V.M.A. Council and Committee Meetings, Royal (Dick) Veterinary College, Edinburgh.

July 15th.—Meeting of the Mid-West Division, N.V.M.A., at the Royal Veterinary College, Camden Town, 3 p.m.

Aug. 21st-25th.—Thirteenth International Veterinary Congress, Zürich.

Aug. 26th-27th.—Thirteenth International Veterinary Congress, Interlaken.

Sept. 5th-9th.—Annual Congress, N.V.M.A., at Glasgow.

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PERSONAL

For the forthcoming session of the Comparative Section of the Royal Society of Medicine, Professor Thomas Dalling, M.A., M.R.C.V.S., has been unanimously elected as President.

R.C.V.S. OBITUARY

LANE, Arthur Henry, Lieutenant-Colonel, late R.A.V.C., 54, Sheffield Terrace, W.8. Graduated London, 1892. Fellowship May, 1896. Died June 16th, 1938; aged 70 years.

Colonel Arthur Henry Lane, F.R.C.V.S.

In the course of a striking tribute to "a great patriot," the *Kensington News* says of Colonel Lane, whose death we record with much regret, "He rendered much public service with a spirit of intense patriotism and was author of that well-known book, 'The Alien Menace,' which was first published in 1928. It went through several editions, which contained a foreword by the late Lord Sydenham of Combe. The fifth and last edition appeared in 1934. The last book he wrote, 'The Hidden Hand,' was published shortly before his death. He was also a frequent contributor to 'The Patriot,' 'National Citizen,' 'Free Press,' 'Fascist,' and 'British Lion.'

"Colonel Lane was elected a Councillor on the Kensington Borough Council on December 6th, 1928, to fill a vacancy in the Redcliffe Ward, and he was re-elected Councillor on November 1st, 1931. He served on the Finance Committee, 1928-34, and on the Law Committee, 1932-34. He did not seek re-election on November 1st, 1934.

"For many years he was prominently connected with the South Kensington Conservative Association, the Kensington Branch of the National Citizens' Union, and the Kensington Branch of the Navy League. He was a member of the Executive Committee of the South Kensington Conservative Association, and of the Holland Ward Committee, and Vice-President of the South Kensington Junior Imperial League. He also took an active interest in the Kensington Branch of the National Citizens' Union, of which he was a member for some years, and in the Kensington Branch of the Navy League, of which he was a member of the committee."

The late Colonel Lane served in the South African War and, says the *Kensington News*, "a friend has written of him:—

'During his life Lieut.-Colonel A. H. Lane was associated with many patriotic movements, but by none will his death be more lamented and his loss felt than by the Kensington Branch of the Navy League. He was not only an energetic and influential member of the Kensington Branch Committee, but by his never failing kindness and hospitality that committee came to regard his house, 54, Sheffield Terrace, as a natural rallying ground for its many meetings during many years. The meetings at his house in connection with the Navy League were, however, not confined to committee meetings, but larger branch meetings were also held there on occasions, and they must have caused both him and Mrs. Lane an immense amount of preparation and domestic arrangement. But that kind of difficulty was as nothing to them if they felt that they could thereby serve a patriotic cause which they had at heart.

'Colonel Lane was not only a kind host in the physical ways just mentioned. He excelled as a host on the mental plane. Loyal to his own sense of honour, which was keen, he was equally loyal and a firm friend to those who joined him in his untiring work and efforts for the good of England. Those who knew him and worked with him, wish that there could be in English life more men of the type which he personified. The true monument to any man are the memories which he leaves behind him amongst his survivors. By them Colonel A. H. Lane will be remembered with affection, gratitude and esteem. In these days such men in public life—alas—are rare, but those who knew him know also that the type is not impossible.'"

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GENERAL OBITUARY

Mr. C. F. M. Swynnerton

RESEARCH ON TSETSE FLY

Mr. C. F. Massy Swynnerton, C.M.G., Director of Tsetse Research in Tanganyika Territory, who lost his life on June 8th in an aeroplane accident in that country, was born in India 60 years ago. Educated at Lancing College, he went out to Southern Rhodesia at the age of 19, where, says *The Times*, while engaged in farming, he found time to study the birds and plants of Mashonaland, on which he wrote several important scientific papers, and made a large number of valuable experiments to elucidate the significance of the colours of insects.

"Later he turned his attention to the habits of tsetse flies, and in 1921 he published a paper which threw an entirely new light on the possibility of reducing this scourge of Tropical Africa by controlling the special types of vegetation which are essential for its existence. Shortly afterwards he was appointed as the first Game Warden of Tanganyika Territory, with special instructions to make a study of the tsetse problem. The latter side of his work developed to such an extent that in 1928 a special Tsetse Research Department was inaugurated with Mr. Swynnerton as its Director. This team of scientific workers, trained and inspired by him, have already freed some 1,500 square miles of territory from this dangerous fly, a task which has been accomplished in the face of difficulties which at times have seemed almost insuperable.

"Lately Mr. Swynnerton devised a new method of control, which consists merely in preventing the burning of the grass for several years. In a letter written shortly before his death he described a large scale experiment of this kind and stated that the effect upon the fly had been simply catastrophic. Here, then, is a measure which holds out hopes that in suitable areas the fly can be eradicated on a scale that had not previously seemed possible without excessive cost. It is to be hoped that the untimely death of this benefactor of humanity in Africa will not prevent his valuable work from being continued and expanded."

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AIR-RAID PRECAUTIONS: COLONEL STORDY'S EXPERIENCES IN ABYSSINIA

The following extract from Colonel R. J. Stordy's report on his experiences in Abyssinia is reproduced from the Interim Report of the R.S.P.C.A. Silver Star Veterinary Unit (1935-36). It deals with "air-raid precautions" in Addis Ababa, and in view of the part to be played by the profession in preparations for the care of animals in chemical warfare, we think that Colonel Stordy's first-hand account may well prove of interest to our readers.

". . . . With the appearance of the aeroplanes every shop in the town was closed, and there was a general stampede of the entire population to the open spaces of the countryside, motor cars, ponies, mules and donkeys being used to transport them.

"Personally, I created quite a sensation by seeking the large open space in the compound clad in pyjamas and a tin helmet, but I was not such a fool as I must have looked for, with the experience of Harar still fresh in my mind, I preferred the open space to a wooden bungalow, and the steel helmet afforded protection from the spent bullets which kept dropping around.

"The Italians had by this time established an aeroplane base somewhere in the Danakil country and were, therefore, within easy flying distance of the capital; so, in anticipation of further visits, the construction of a 'funk hole' was decided upon. This was found to be a comparatively easy matter, for in searching for suitable location a stone-built arched secret passage was discovered leading to an underground cellar in a fortified house close to my bungalow. Lloyd, who had had mining experience, very soon strengthened the arch roof with wooden props and with several tons of earth thrown over the top and sandbags arranged around the entrance, a shelter to hold 30 people was ready for any emergency.

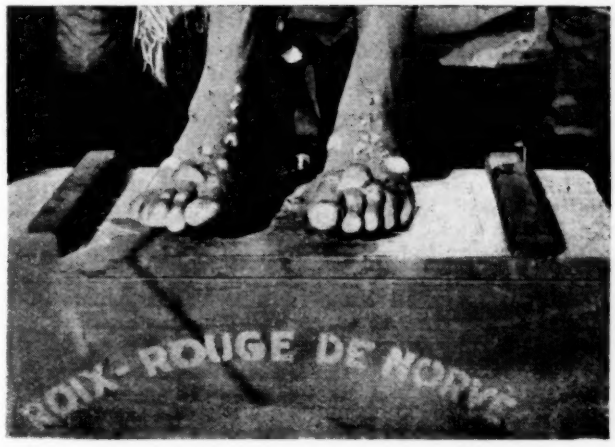
"At this time the following 'air-raid precautions' were issued from the British Consulate for the information and instruction of British subjects:—

1. If there is only local warning for a definite date, the Diplomatic Quarter may equally well be bombed as the town area; also, the approach roads will be dangerous. In that event, therefore, all British subjects are advised: to lock up their houses and leave for the nearest trenches or open space, and immediately aircraft are heard, to avoid groups and crowds and lie down. If they prefer to go as far as the Legation, and have time to reach it, they will be able to take shelter in the Legation grounds.

2. If there is no warning, the most immediate danger will be from aircraft, and the roads leading out of the town may be very dangerous for groups. In that event, therefore, all British are advised: to lock up and leave their houses at once and lie flat in trenches or ditches or in open spaces.

3. Gas masks. The British Consul has discussed with the Spokesmen the possibility of lending gas masks to British subjects. They are agreed that if the gas masks were distributed to the British in the town, the fact would be widely known and might tend to increase popular panic and endanger the British carrying gas masks. It is therefore deemed safer not to lend out the gas masks, unless in exceptional isolated cases. Instead, they will be kept in a store near the Legation gates, for immediate issue to all British who reach the Legation if gas is detected or expected.

Blistering Caused by Yperite



A "Close-up" of the Same

"The suffering of the men who had been gassed in the war zone had struck terror into the hearts of the populace; therefore, it was a wise precaution to hold all gas masks at the Legation.

"The Emperor, in a letter to the Empress describing the awful effects of mustard gas (yperite), wrote: 'What breaks my heart is to hear my gassed men screaming and moaning with pain, and when my friends return to find some unrecognisable owing to burnt faces.' When, therefore, the Empress made a strong appeal for masks to mitigate the effects of the poison gas, the Ethiopian Women's Work Association, numbering some 56 members, and ably directed by Lady Barton, undertook to turn its efforts to the manufacture of gas masks for the soldiers. This was indeed a problem, for there was a large number required and there was little choice of suitable material to hand. After consulting the medical men on the spot and officers acquainted with preventive gas measures, a thick khaki flannel material was selected for the hood. This was impregnated with a strong sodium solution, a visor of mica was inserted, and by an ingenious arrangement of rubber tubing free respiration was ensured. The masks were more or less similar to the primitive ones used on the Western Front when we were first introduced to chemical warfare. No doubt such masks were of limited use; nevertheless, they gave a measure of protection in gullies and low-lying areas where gas-laden air accumulated and permitted men to reach higher altitude with some degree of safety; the moral effect of their use was considerable.

"Yperite has the same dire effect on animals as it has on men, and the skin of equines is peculiarly susceptible to its action. To be in a position to deal with gas cases the Unit had had a large quantity of bleaching powder sent from England.

"Happily, Addis Ababa was never bombed, but every aeroplane visitation caused a total cessation of business and the departure of large numbers of the inhabitants to the environs of the city. It was noted that when planes were overhead the car I had on hire was never brought to the compound until late in the day, the chauffeur excusing himself on the grounds that the aeroplanes had a terrifying effect on him. I ascertained, however, that the chauffeur, with my car and with my petrol, had been busily engaged in transporting fugitives to the country at rates highly remunerative to him! . . . ."

A.R.P. AT THE LONDON ZOO

The Zoo Correspondent of the London *Evening Standard* states that, at a recent meeting of the Zoological Gardens Committee, at which all curators were present, the following decisions were taken:—

No visitor will be allowed in the gardens during an air raid. On receipt of a warning the grounds will be cleared as quickly as possible.

Firearms will be issued to head-keepers at the Zoo for use in the event of a raid. The moment an alarm is given they will patrol the grounds, rifle in hand. If any dangerous animal is liberated by an explosion it will be shot. Venomous snakes will either be killed immediately on receipt of a raid warning or, if they are very rare specimens, will be secured in strong metal boxes and taken down into the cellars of the reptile house.

Precautions are to be taken at the aquarium, where the preservation of a certain amount of seawater is essential. On receipt of a warning all large tanks will be half-emptied, and the water will be stored in the basement.

Keepers are to be instructed how to deal with incendiary bombs. Fire apparatus will be available at strategic points in the grounds.

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CHEMICAL WARFARE AND THE SKIN*

"In this book," states the *Pharmaceutical Journal*, "a distinguished Czechoslovak dermatologist explains the effects of poison gases upon the human being, especially the skin. The appropriate treatment is indicated and the author discusses the subject in a semi-popular manner, adding a three-page summary in English. The book is noteworthy because Dr. Petrácek distinguishes three pathological degrees in the action of such vesicants as mustard gas. He points out that the danger of air attack is as real in Czechoslovakia as it is in England, and therefore the situation has to be taken seriously. On account of its English summary the book merits the attention of British readers interested in A.R.P."

*"Bojové Látky Chemické a Kuze" (Chemical Warfare and the Skin). By Dr. E. Petrácek. Pp. 54. Price 15 crowns (2s. 6d.). Prague General Hospital.

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LEGAL NOTES

Forbidden to Keep Sheep.—Binding a man over for three years for permitting unnecessary suffering to six sheep by allowing them to be conveyed to market when in an unfit state, the Kingston-on-Thames Bench made it a condition that he must not keep sheep or cattle during that period. The defendant, Reginald Taylor, described as of Wormholt Road, Shepherds Bush, was ordered to pay £15 15s. 0d. costs. Mr. Gordon Jones, prosecuting for the R.S.P.C.A., said the sheep were found to be emaciated and weak when they were unloaded at Kingston Cattle Market. Inspector T. F. Perry, of the Society, said the animals had been kept in a field which was "a mud-covered dump in the heart of a factory area." Taylor said he was a cartage contractor and sheep were a side-line. If he had thought the animals were unfit to go to market he would not have sent them.

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Painted Cow.—An allegation that a cow had been smeared with paint to conceal its identity was made in a case at Airdrie Sheriff Court when a Lanarkshire farmer was found guilty of having, between December 2nd, 1937, and May 1st, 1938, failed to inform the owner of the cow that it had strayed into his property, and of having retained and appropriated it to his own use. A fine of £20 with the option of 60 days' imprisonment was imposed.

Evidence was given that the cow belonged to another farmer and that it was a brown and white Ayrshire.

A veterinary surgeon stated that brown paint had been smeared over the animal, apparently by hand.—*Farmers' Weekly.*

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INTERNATIONAL VETERINARY CONGRESS—ZURICH AND INTERLAKEN

We understand that, owing to the fact that the Imperial Veterinary Congress takes place in London from August 15th to August 18th, it has been decided to change the departure date of the Continental conducted tour from August 17th to August 19th, the two days to be omitted from the stay in Zurich. The departure time from London will now be 2 p.m. instead of 11 a.m. This will allow delegates a little more time to prepare for their trip.

All British passports must now be visaed for Germany. The cost is 13s. 6d. per passport to allow a single journey to Germany and back. The American Express Company will be pleased to obtain German visas for delegates attending the Congress if they will send in their passports.

We reproduce below an amended itinerary and estimate.

Amended Itinerary and Estimate

August.

Fri. 19th.—Leave London (Victoria) at 2 p.m. *via* Dover/Calais to Paris—HOTEL GRAND.

Sat. 20th.—Paris (Est) depart 8.10 a.m. by day train to Zurich, arrive 4.14 p.m.

Sun. 21st. to Thur. 25th.—In Zurich. International Veterinary Congress—HOTEL DOLDER GRAND.

Fri. 26th.—Proceed to Interlaken.

Sat. 27th.—In Interlaken at leisure—HOTEL VICTORIA JUNGFRAU.

Sun. 28th.—*Via* Berne and Zurich to Constance—HOTEL INSEL.

Mon. 29th.—In Constance at leisure.

Tues. 30th.—Afternoon train to Bale and Freiburg I/B.

Wed. 31st.—In Freiburg—HOTEL ZAHRINGERHOF.

September.

Thur. 1st.—Morning train to Heidelberg.

Fri. 2nd.—In Heidelberg at leisure—HOTEL EUROPAHOF.

Sat. 3rd.—To Frankfurt A/Main.

Sun. 4th.—In Frankfurt at leisure—HOTEL CARLTON.

Mon. 5th.—Morning train to Wiesbaden—HOTEL NASSAUERHOF.

Tues. 6th.—Rhine steamer to Cologne—HOTEL DOM.

Wed. 7th.—Leave Cologne *via* Ostend/Dover to London arriving in the evening.

. . . . .

The cost of the tour as outlined is £31 14s. 0d. per person based on a party of 15 or more persons. Should there be less than 15 persons in the party an increase in the cost will be necessary.

Second class rail transportation and first class on all steamers.

Accommodation at the hotels specified in the itinerary consisting of bedroom and plain Continental breakfast only. Luncheons and dinners not included. In Paris a private bathroom will be provided with the room (there are no double rooms without private bathrooms) but elsewhere room without bath is included.

Gratuities to hotel servants.

State, sejour and municipal taxes.

Transfers between stations and hotels and *vice versa*, but excluding porterages at the various stations.

Services of an expert courier who will be with the party and will attend to all baggage matters.

Meals *en route* are not included.

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FOOT-AND-MOUTH DISEASE IN NATAL

An Exchange message from Durban, dated June 27th, states "Newspapers to-day describe the outbreak of foot-and-mouth disease in Natal as 'a national calamity.' Mr. C. J. Venheerden, Assistant Director of Veterinary Services, addressing farmers, said that it might eventually be necessary to slaughter 500,000 cattle in the affected areas which are at present under a Stand-still Order. He added that a blow to the export trade to Britain might plunge the Union into an economic crisis. The movement of agricultural products for sale and export is still prohibited throughout Natal."

* * * * *

FILM ILLUSTRATING MOVEMENT OF A FOETUS

At a meeting of the Royal Society held on February 10th, Sir Joseph Barcroft and D. H. Barron showed a film illustrating the development of movement in the foetus of the sheep. This was described as follows in a subsequent issue of *Nature*: "The development of movement was depicted in respect of: (*a*) the types of movement which appear at different foetal ages, and (*b*) the individuation of certain sorts of purposive movement from a general mass movement. The period of gestation is about 145 days. Up to about 35 days, the foetus is immobile (type 1). At 35 days it commences to exhibit movements which are always 'jerky' (type 2). At 47 to 50 days it is in almost incessant motion, which is 'sustained' (type 3). After 50 days the foetus becomes quiescent (type 4). The following analysis may be made of these types: If the spinal cord be cut just below the brain at 60 days, without taking the foetus out of the uterus, and the foetus be allowed to continue growing until the cut fibres have degenerated, its body will exhibit jerky movements (type 2), whilst its head is quiescent (type 2). If the central nervous system is transected below the pons, the whole foetus exhibits jerky movements (type 4). If the central nervous system is sectioned above the red nucleus the foetus exhibits sustained movements (type 3). The mechanism for the integration of 'jerky' into 'sustained' movements is in the region of the red nucleus, and the mechanism for the inhibition of movement is preponderantly above that. Later parts of the film showed the development of respiratory movements (especially in relation to somatic movement), the development of progressive movement and the development of 'righting' movements."

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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N.V.M.A. Congress at Glasgow

To the Editor of the Veterinary Record

Sir,—May I crave space in your journal to draw the attention of members of the profession who are likely to be attending the Congress this year in Glasgow, to the need for booking their hotel accommodation as soon as possible. Those hotels who were good enough to promise to reserve accommodation are finding that, owing to the amazing success of the Empire Exhibition, pressure on their space is becoming acute; consequently, although it is yet some time until the period of the Congress, it will be to the benefit of all concerned to book now.

Yours faithfully,

Alex. Thomson,
Hon. Local Secretary.

220, Albert Drive,
Pollokshields,
Glasgow, S.1.
June 13th, 1938.

* * * * *

Central Library for Animal Diseases

To the Editor of the Veterinary Record

Sir,—To suit the convenience of readers it has been decided to keep the library open until 7 p.m. on two evenings a week. The hours during which the library will be open are therefore:—

Mondays and Thursdays—10 to 5
Tuesdays and Fridays—10 to 7
Wednesdays and Saturdays—10 to 12.30

Yours faithfully,

Fred Bullock,
Librarian.

10, Red Lion Square,
London, W.C.1.
June 25th, 1938.

* * * * *

A SUSPECTED CASE OF AUJESZKY'S DISEASE

To the Editor of the Veterinary Record

Sir,—On reading the article "Aujeszky's Disease," in the *Veterinary Record* of June 18th, my mind was immediately taken back to a peculiar case seen in a Cheviot ewe, in the autumn of 1936.

The sheep was lying down and unable to rise. Salivation was profuse. The animal was continually gnawing at the limbs, the hind limbs in particular; the skin was broken and bleeding in many places. It was especially noticed that if any part of the body was even touched with the finger, the sheep immediately gnawed at

that spot for a short time, then returning to attack the limbs as before.

The ewe died on the evening of the day seen. No other sheep in the flock was affected.

Yours faithfully,
S. G. Stewart.

Killinchy,
Co. Down.
June 21st, 1938.

* * * * *

METHODS OF TUBERCULIN TESTING

To the Editor of the Veterinary Record

Sir,—I believe that in our archives there exists sufficient evidence to show that, providing accuracy is observed in the application and in the interpretation, there is little to choose between the double intradermal and the single injection caudal fold for accuracy.

At the same time the former is preferable and I hope will not be departed from, for reasons which must be known to those conversant with the habits of the bovine, especially when the grass, such as it is, is new! It is, I think, open to doubt that the caudal fold site requires less restraint than the other. My experience has been the reverse. Providing the Schimmel needle is used (and I do urge the short variety) and the site is not selected too far forward, it will be found that only a small minority have to be held, and there will be no need to delay unduly to decide at what depth, according to the skin measurement, to inject tuberculin. Measurements—as everyone will, I think, agree—are superfluous; the normal one will be found to vary according to various sites chosen, and according to the looseness or tightness with which the calipers are applied. The local reaction should be noted and described. It is its nature, and not its measurement, which decides whether the result is positive or negative. This has been so often described that there is no need to do so again now. I should very much hesitate to ascribe to any test a degree of accuracy approaching 100 per cent., although I am as keen a disciple of the test in question as the correspondent who makes this claim.

I certainly do not agree with the statement that bovines which react at the seventy-second hour, showed a reaction at the forty-eighth hour, *or even earlier*. I agree that the greatest number of positives are *usually* found at the forty-eighth hour, but there are exceptions. I have at the moment, one herd of Ayrshires (flying herd), endeavouring by three-monthly tests to become clean, and out of the three tests so far applied, the greatest number of positives with the first two tests were encountered at the seventy-second hour. As a purely personal opinion, I regard it a mistake either to look for results earlier than the forty-eighth hour, or to conclude at the seventy-second hour that all positives have been eliminated. A final visit, as late as the one hundredth hour or later, will, especially in herds not tested before, reveal the existence of positives which were negative up to and including the seventy-second hour. The existence of these so called "delayed" reactors is well known to the general practitioner.

Instead of advocating the return to a site which was discarded some time ago, I think it would be better to suggest amendments to the well tried double intradermal: abolishing measurements, going by the nature of the swelling, and insisting that the test must be prolonged beyond the seventy-second hour to a final hour which opinion has found to be the most desirable. Further, until a herd is free of positives, tests must be repeated every three calendar months; and when free, every six calendar months. Twelve months is too long a period of grace to allow to a herd even when free of positives.

Yours sincerely,
J. F. D. Tutt, F.R.C.V.S.

Winchester.

DISEASES OF ANIMALS ACTS, 1894 to 1937, and AGRICULTURE ACT of 1937 (PART IV)

SUMMARY OF RETURNS

Period.	Anthrax.		Foot-and-Mouth Disease.		Parasitic§ Mange.		Sheep Scab.	Swine Fever.	
	Outbreaks confirmed.	Animals attacked.	Outbreaks confirmed.	Animals slaughtered as diseased or exposed to infection.	Outbreaks reported by the Local Authorities.	Animals attacked.	Outbreaks confirmed.	Outbreaks confirmed.	Swine slaughtered.
	No.	No.	No.	No.	No.	No.	No.	No.	No.
Period 1st to 15th June, 1938	31	34	1	18	2	4	4	41	36
Corresponding period in									
1937	26	34	2	278	5	5	6	69	48
1936	16	19	—	—	1	2	2	57	24
1935	13	14	—	—	3	47	8	108	67
Total 1st January to 15th June, 1938	460	502	153	19,243	45	73	102	261	161
Corresponding period in									
1937	384	443	5	540	82	119	122	569	357
1936	253	300	4	379	69	205	137	990	688
1935	200	224	32	10,111	67	144	186	861	422

Note.—The figures for the current year are approximate only. § Excluding outbreaks in Army Horses.

N.V.M.A. Congress, Glasgow, September 5th-9th, 1938

PROVISIONAL PROGRAMME

The following is the Provisional Programme of the Association's Congress to be held at Glasgow from September 5th to September 9th, 1938 :—

SUNDAY, SEPTEMBER 4TH.
" At Home," as guests of the Scottish Divisions (Central Hotel).

MONDAY, SEPTEMBER 5TH.
Morning.—Civic Welcome.
Opening of Exhibition of Drugs and Instruments.
Paper : " Virus Diseases, with Special Reference to Immunity " (Concert Hall, Empire Exhibition, Bellahouston Park).
Afternoon.—Motor Tour : " Three Lochs " (Loch Lomond, Loch Long, and Gareloch).
Evening.—Civic Reception (City Chambers, George Square, Glasgow).

TUESDAY, SEPTEMBER 6TH.
Morning.—Paper : " The Problems of the Practitioner with regard to the Diagnosis and Treatment of Diseases of Young Pigs " (Concert Hall, Exhibition).
Afternoon.—Demonstrations.
Council Meeting (Glasgow Veterinary College).
Evening.—President's Reception (Central Hotel).

WEDNESDAY, SEPTEMBER 7TH.
Morning.—Paper : " Mastitis."
Annual Meeting.
Congress Photograph (Exhibition).
Afternoon.—Golf Competitions (Cathkin Braes Golf Club).
Evening.—Annual Banquet (Central Hotel).

THURSDAY, SEPTEMBER 8TH.
All-day excursion by steamer—Clyde, Firth, Kyles of Bute.
Evening.—Veterinary Benevolent Dance (Ca'dora Restaurant).

FRIDAY, SEPTEMBER 9TH.
Morning.—Three Short Papers.
Afternoon.—Closing Meeting (Exhibition).
Council Meeting.

SUBJECTS FOR PAPERS

The following is the list of Papers which has been finally agreed on :—

MONDAY, SEPTEMBER 5TH.
" Virus Diseases, with Special Reference to Immunity."
Reader : Professor Edward Hindle, M.A., SC.D., F.R.S.E., Regius Professor of Zoology, Glasgow University.
Openers : Professor T. Dalling, M.R.C.V.S., Cambridge ; G. W. DUNKIN, M.R.C.V.S., D.V.H., Compton, Berkshire ; Dr. W. H. ANDREWS, .D.SC., M.R.C.V.S., Weybridge ; I. A. Galloway, B.SC., M.R.C.V.S., London.
President : Dr. W. S. Gordon, PH.D., M.R.C.V.S.
Vice-President : Dr. R. F. Montgomerie, PH.D., B.SC., F.R.C.V.S.
Recording Secretary : W. Lyle Stewart, M.R.C.V.S.

TUESDAY, SEPTEMBER 6TH.
" The Problems of the Practitioner with regard to the Diagnosis and Treatment of Diseases of Young Pigs."
Reader : H. G. Lamont, M.SC., M.R.C.V.S., Stormont, Belfast.
Opener : G. C. Marginson, M.R.C.V.S., D.V.S.M., Preston.
President : P. J. Howard, M.R.C.V.S.
Vice-President : F. Beckett, F.R.C.V.S.
Recording Secretary : G. A. Sangster, M.R.C.V.S.

WEDNESDAY, SEPTEMBER 7TH.
" Mastitis."
Reader : Professor D. H. Udall, Cornell University, Ithaca, New York.
Openers : W. Nairn, M.R.C.V.S., Blairgowrie ; S. J. Edwards, B.SC., M.R.C.V.S., Ayr.
President : J. R. Barker, M.R.C.V.S., D.V.H.
Vice-President : Professor J. F. Craig, M.A., F.R.C.V.S.
Recording Secretary : O. V. Gunning, D.V.M. (OHIO), M.R.C.V.S.

FRIDAY, SEPTEMBER 9TH.
(Paper 1.) " Heel Bug in Horses."
Reader : A. C. Fraser, B.V.SC., PH.D., M.R.C.V.S., Lambourne.
Opener : J. W. Beaumont, M.R.C.V.S., Louth.
(Paper 2.) " Poultry Husbandry and its Influence on the Incidence and Spread of Disease."
Reader : J. E. Wilson, B.SC., M.R.C.V.S., Edinburgh.
Opener : N. Dobson, B.SC., M.R.C.V.S., Weybridge.
(Paper 3.) " Beta Haemolytic Streptococcal Infection in Dogs."
Reader : Tom Hare, M.D., B.V.SC., M.R.C.V.S., London.
Opener : H. W. Steele-Bodger, M.R.C.V.S., Tamworth.
President : Professor G. W. Weir, J.P., M.R.C.V.S.
Vice-President : H. Gillmor, M.R.C.V.S.
Recording Secretary : S. G. Abbott, M.R.C.V.S., D.V.S.M.

Demonstrations

1. Clinical Diagnosis of Blood. Professor J. W. Emslie, M.R.C.V.S., B.SC. (AGRIC.), Glasgow.
2. (*a*) Urine Analysis. Professor G. F. Boddie, B.SC., M.R.C.V.S., Edinburgh.
(*b*) Poisonous Plants. Professor G. F. Boddie, B.SC., M.R.C.V.S., Edinburgh.
3. Methods of Estimating Worm Infestation in Animals. E. L. Taylor, M.V.SC., M.R.C.V.S., D.V.H., Weybridge.
4. Methods for Clinical Diagnosis of Skin Conditions. J. W. H. Holmes, M.R.C.V.S., D.V.S.M., London.
5. Methods for Detection of Open Tuberculosis. J. S. Steward, F.R.C.V.S., D.V.S.M.
6. Tuberculin Test in Poultry and Pigs. (To be arranged)
7. Radiology Section, showing comparative radiographs.
*8. Spinal Anaesthesia in the Cow and Horse and the Technique of Nerve Blocking for Dehorning Cattle. Professor T. G. Browne, M.R.C.V.S., Dublin.

*It is recognised that a number of demonstrations on spinal anaesthesia have been given at previous Congresses within recent years, but these have proved to be of such special interest to a very large body of the profession that the Provisional Committee are confident that the repetition of these demonstrations by Professor Browne will still prove interesting and instructive to many practitioners.

HOTEL LIST

The following hotels have been approached, and have agreed, subject to bookings being made early in the year to reserve accommodation for delegates to the Congress. The accommodation indicated represents the extent of the promised reservations and not, in each case, the total accommodation of the hotel.

CENTRAL HOTEL. (Licensed.)
This will be recognised as the headquarters hotel. Situated in the Central Station, it can be described as being in the centre of Glasgow, and from which all parts are easily accessible by rail, tram or bus. It is also convenient to the river steamers. The Annual Banquet and President's Reception will be held in this hotel.
Accommodation: 50 double and 50 single rooms at 16s. 6d., bed and breakfast.

SAINT ENOCH HOTEL. (Licensed.)
A first-class Station hotel.
Accommodation: 10 double, 10 single at 14s. 6d., bed and breakfast.

ADELPHI HOTEL. (Licensed.)
A good class commercial hotel.
Accommodation: 10 double at 12s. 6d., bed and breakfast.

NORTH BRITISH STATION HOTEL. (Licensed.)
A first-class Station hotel.
Accommodation: 9 double, 6 single, at 14s., bed and breakfast.

THE BERESFORD HOTEL. (Licensed.) Sauchiehall Street.
This is a new hotel. Built to the standard of modern commercial hotels, it should be very comfortable, and its situation is very central.
Accommodation: 40 double, 20 single, at 12s. 6d., bed and breakfast.

GRAND HOTEL. (Licensed.) Sauchiehall Street.
A good-class commercial hotel.
Accommodation: 22 double, 8 single, at 11s. 6d., bed and breakfast.

GEORGE HOTEL. (Licensed.) Buchanan Street.
Accommodation: 80 persons, from 9s. 6d., bed and breakfast.

MORES HOTEL. (Private.) India Street.
Accommodation: 64 persons. Terms: 10s. 6d., bed and breakfast; 4½ Guineas per week. For a stay of not less than three days, 15s. 6d. per day.
This is a very comfortable private hotel in a central position in the city. The figures given for accommodation are the total of accommodation, and bookings will be taken in the ordinary way.

The following private hotels are situated within a short distance of each other in Great Western Road. They are all well appointed and are within 5 minutes of the centre of the city by tram, bus or underground.

BELHAVEN HOTEL.
Possible vacancies: 20 to 30 people.
Terms: Bed and breakfast, 10s. 6d., double room; Bed and breakfast, 11s. 6d., single room; Dinner and breakfast, 15s.

KIRKLEE HOTEL.
Possible vacancies: 10 single, 10 double.
Terms: Bed and breakfast, 8s. 6d.; Per day, 13s. 6d.; Dinner, 4s. 6d.

GROSVENOR HOTEL.
Possible vacancies: 10 double rooms.
Terms: Bed and breakfast, 8s. 6d. to 9s. 6d., single; 7s. 6d. to 8s. 6d., double. Dinner, 3s. 6d.

WESTBOURNE HOTEL.
Possible vacancies: 14 rooms.
Terms: Bed and breakfast, 8s. 6d., single; Per day, 12s. Dinner, 3s. 6d.

WOODLANDS GATE HOTEL. 11, Lyndoch Place, C.3.
Possible vacancies: 10 rooms.
Terms: Bed and breakfast, 7s. 6d., single. Dinner, 3s.

*MACLAY HALL. 7, Park Terrace, Glasgow, C.3.
This is one of the student hostels.
A minimum accommodation of 25 persons has been promised by the Warden, with a possible maximum of 40 to 50.

The charges where delegates share double rooms will be 7s. or 8s. for bed and breakfast, according to size of room. For single rooms the charge will be 9s. or 10s.
These charges will cover the free use of the Hall Playing Courts, Gymnasium, Billiard Room, Baths and Sprays.
A fine Lounge could, further, be reserved for the exclusive use of delegates provided the number were sufficient to justify this arrangement.

*The Maclay Hostel provides accommodation for men only.

The need for booking hotel accommodation as early in the year as possible cannot be over-emphasized. The influx of visitors to the City throughout the period of the Empire Exhibition will be very great.

The Hon. Local Secretary strongly advises all those attending the Congress to reserve hotel accommodation at once;

also

the return to him of the completed ticket form (included in this issue) as far as possible in advance of the date for final receipt intimated thereon will be appreciated as a great convenience.